FEB 17 1925
Engineering Library

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Vol. 52
Number 7

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, FEBRUARY 12, 1925

35c. a copy
$3.00 a year

To secure a place in the bodies of the *quality* cars of the world, it is imperative that the hardware be of corresponding quality.

It must be practical in design—durable in construction—dependable in operation—and reasonable in cost.

Ternstedt Hardware is found in the bodies of *quality cars.*

TERNSTEDT
WORLD'S LARGEST MANUFACTURERS OF AUTOMOBILE BODY HARDWARE
Division of Fisher Body Corporation
DETROIT U. S. A.

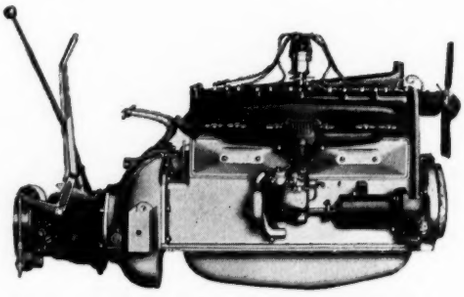
Entered as second-class matter Jan. 2, 1906, at the post office at New York, N. Y., under the Act of March 3, 1879

Ralph Mulford making the record Mt. Wilson Climb in a strictly stock Cleveland Six.

Cleveland-Federal-Mogul Equipped Sets New Hill Climb Record

BATTLING against time on torturous, steep mountain grades, Ralph Mulford in a Cleveland Six touring car shattered the stock car speed record on Mount Wilson, thereby gaining the famous Los Angeles Express permanent challenge trophy for the fastest time up the Mt. Wilson grade. Another record for Cleveland and another record for Federal-Mogul.

The first Federal-Mogul Bearings supplied to Cleveland were for their very first car. Engine and automobile manufacturers who use Federal-Mogul products find it pays to continue using them.



The Cleveland Six engine is equipped with Federal-Mogul bronze back babbitt lined bearings. Connecting rod bearings are lined with Mogul Alloy Genuine.

FEDERAL-MOGUL CORPORATION

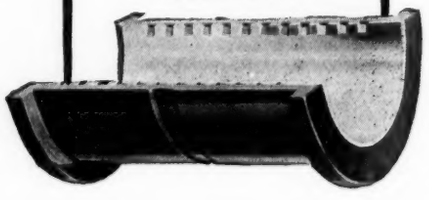
A Consolidation of the MUZZY-LYON CO. and the FEDERAL BEARING AND BUSHING CORPORATION

DETROIT, MICH.

Mogul FEDERAL

The Federal-Mogul Complete Line

Bronze Back Babbitt Lined Bearings
Die Cast Babbitt Bearings and Bushings
Bronze Bushings
Bronze Washers
Bronze Castings
Babbitt Metals
Bronze Cored and Solid Bars



"A manufacturer's reputation is safe with Federal-Mogul Products"

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. 52 NEW YORK—THURSDAY, FEBRUARY 12, 1925 No. 7

Let's Get This Straight—

"The Automobile Business Has Its Best Days Ahead"

By Norman G. Shidle

A BIT of plain talking once in a while is good for the soul.

The automotive industry has been a target for editorial comment in publications of all kinds for some time. Its problems seem to be worrying a lot of people on the outside more than they are the executives and students in close touch with its progress and possibilities.

A reader of all the things that have been written recently on the outside might well gather the impression that everything is in a terrible mess; that only a very few companies can hope to survive the terrific stress and strain of the next few years; and that the "saturation point" is going to bring on a great cataclysm in the very near future.

This saturation point thing is getting to be the limit. We've begun to think—but more of that a little later. The main point to be established at once is this:

The automotive industry isn't in the slightest danger of going to pot.

Nobody recognizes the presence of quite complex problems and of very real marketing dangers any better than the men who are directing the destinies of motor car factories today. Some of these men have a clearer vision of conditions than others. That is inevitable. But by and large there's just as much intelligence emanating from the brain cells of automobile men as from the heads of executives in other industries.

Some scare heads about the automotive industry have resulted from statements made by important automobile executives, but very frequently the ideas of these men have been improperly interpreted to and by the public at large. During Chicago show week, for example, newspaper headlines announced that Charles W. Nash had said that the saturation point had been reached. A day or so later the waiting public was informed that John N. Willys had contradicted Mr. Nash and had claimed that the saturation point was far in the future.

Well, we heard the speeches made by both of these executives. By picking out one or two sentences from each of their talks, it is possible without difficulty to find them in direct opposition to one another as regards the saturation point. But full consideration of everything that both of them said indicates very strongly that if the two sat down together to argue the point—as probably they will some day—they will agree quite fully at the end of 5 minutes' conversation.

Plenty of other instances of a similar nature might be cited. This one just happens to be fresh

IT'S one thing to recognize frankly the troubles that lie ahead and then plan intelligently to meet them.

It's quite another to ring an alarm and get a crowd out to see a fire when only a little smoke is rising from a few dry leaves.

Neither the Pollyannas nor the crepe-hangers have the right dope on what's going to happen in the automobile industry.

This article contains a little plain speaking on affairs automotive.

in mind. The point is that the big automotive executives, almost without exception, have a pretty clear view of the future and don't disagree fundamentally with one another as regards general trends.

In an article published recently in an advertising trade paper the writer says that a typical automotive situation is presented with the beginning of 1925. "The automobile folks had dreamed big things for 1924," he states. "Ford and General Motors alone had planned for 4,200,000 cars and, with the other makers' plans, a total of nearly 6,000,000 cars was talked of."

Predictions Were High

Maybe somebody did talk of a total of 6,000,000 cars in 1924. But if he did, we didn't hear him. And in our travels about the industry we haven't met any responsible automobile executive who would have paid any serious attention to such a talker if he had heard him.

Some automobile men did talk about building 5,000,000 cars in 1925. But even the 5,000,000 predictions were confined almost entirely to publicity statements. Such statements, we agree, ought to be more conservative and more frank than they usually are. Still, only the most naïve business analyst would accept such statements in any industry as the basis for serious study of the possibilities of that industry.

But even these publicity stateemnts, as we have said, didn't run over 5,000,000 as an estimated production of both cars and trucks. That in itself is quite a bit different from an estimated total of 6,000,000 cars. A statement might be dug up in which somebody made such a guess. But anybody who knew anything about the industry at the beginning of 1924 would merely have smiled. They probably wouldn't even have taken the trouble to contradict him.

Conversations with many automotive executives just before the beginning of 1924 showed that practically none of them expected to make any material advances over the record output of 1923. True, a fair number were guessing a total car and truck production of 4,500,000, but to offset that group were some close students who guessed as low as 3,750,000.

Not So Bad, After All

Nearly everybody did guess too high. But most people didn't make a mistake of anything like the alarming proportions indicated by the difference between an estimate of 6,000,000 cars and an actual production of something like 3,202,000 cars. If most manufacturers had missed their guess by any such margin a really serious situation might have resulted. But they didn't. And the result was bad overloading, but not any catastrophic debacle.

Now let's take a look at the traffic situation, which undoubtedly is causing a tremendous increase in sales resistance in metropolitan centers. We have been decrying the apparent inability of any authorities to solve satisfactorily this perplexing problem. And we expect to continue to harp on the subject in the hope that our efforts will help to stimulate interest and provide aid in bettering conditions.

But from a sales standpoint there isn't any reason for taking an alarmist view even of the serious traffic situation. Of the cars now in use only about 30 per cent are registered in cities large enough to have many traffic problems. And 70 per cent are being used in areas classed as rural or semi-rural.

Figures about the automobile are given sometimes with more definiteness than strict accuracy permits. We read recently that: "The average life of a car is now eight years. It was six years only recently." There stands the flat statement.

Did you ever sit down actually and try to figure out the life of a car? AUTOMOTIVE INDUSTRIES on one or two occasions has had expert economists and mathematicians work on this problem. On one or two occasions it has published the results of their efforts. But always their conclusions have been stated as tentative and have necessarily been hedged about with reservations. The life of a car can't be determined with any such accuracy as is indicated in the statement quoted; there are grave doubts as to whether it can be determined accurately at all on the basis of data at present available.

Saturation—What Is It?

And now the well-known saturation point. We are greatly tempted to write these paragraphs about it and then exclude the blamed chameleon from our columns forevermore. Talking about the saturation point would be all right if two people ever defined it in the same way. We've had chemical definitions, economist's definitions, engineer's definitions, and use of the phrase without any special definition at all.

Unless the S. A. E. can get across some standardized nomenclature about the saturation point, we can't get much interested in arguing about it. We have read a lot of statements on the subject and we're inclined to agree with a good many of them; inclined even to agree both with those who say the saturation point has not arrived and with those who say it has arrived.

Certainly we can't disagree with Mr. Nash when he says the saturation point has arrived and defines it as the place at which production capacity exceeds demand. He's right, of course. By the same token we can't disagree with Mr. Jordan when he says that the saturation point will have been reached only when cars are built so that they never will wear out and when style ceases to be an element in buying. He's right, too.

How Many Will Survive?

The other thing that seems to be worrying a lot of people is the constantly decreasing number of car manufacturers.

A lot of makers have passed out of the picture. There isn't any doubt about that.

And the future doesn't look very rosy for some of those who are entering the 1925 merchandising battle.

But in viewing this situation, as in studying the others which have been discussed, the conclusion reached is all according to the point of view. To begin with, the prevalence of mergers and combinations shows simply that the automotive industry is

following the normal course pursued by every other industry. Examination of what has happened in these older fields indicates also that no group of three or four firms is going to get all the business.

Already a relatively small number of firms are doing a large share of the motor vehicle business measured in number of units produced. Something like 88 per cent of car production was centered in the hands of about 10 companies last year. But the remaining 12 per cent of the business provided a total retail volume of about $312,000,000 in 1923 and $273,240,000 in 1924. In 1923 something like 85 car makers were sharing this 12 per cent of the total business. The number has dwindled to about 60 in 1924. Probably it will dwindle still further this year. But the fact remains that a very excellent business in dollars and cents still is and probably always will be controlled by companies which do not operate on huge production schedules and which can give the touch of individuality and unusual style that isn't possible in the more standardized products.

The oil industry, despite the fact that it is dominated by one large group of associated producers, provides livelihood for thousands of workmen and profits enough to have made and to maintain several millionaires among independent producers. The steel business has one outstanding organization which overshadows all others in size and in profits, but that company alone does only about half the total volume of the industry. Numerous small firms, as well as three or four larger ones, are operating independently and making money.

Always there will be room in the automotive industry for a fair number of relatively small car builders. They have a very definite function to fulfill and those which fulfill that function best will be the survivors. Chrysler's recent success shows what can be done.

In all of the outside comments made on the automotive industry, however, a very considerable element of truth appears. The industry has permitted, even encouraged, some merchandising practices which simply do not hold water from the standpoint of sound economics. While the outside commentators often take too much of an alarmist attitude and sometimes quote statistics with a bit too much abandon, usually they have some good reason for their statements.

A few basic facts about the automobile business today are pretty generally agreed upon by nearly all executives. Important among these are:

1. Production capacity exceeds demand.
2. Sales costs are rising, as is sales resistance.
3. The industry nearly has reached its period of stabilization, where increases in yearly output are likely to come chiefly as a result of increased population and increasing foreign trade.
4. Further increase in production capacity at this time will not benefit the industry.
5. Because the bonanza period has passed, profits are likely to be more steady and operations more stable in the next five years, but sales are going to be harder to make.

These basic facts are being recognized rather fully in most parts of the industry. Sales effort alone will not increase the total sale of cars past a certain point in a given year. Such effort on the part of a particular company certainly will increase the proportion of total sales taken by that organization, but the effect on total sales for the industry probably will not be great, figured on a percentage pasis.

Consequently, the cost of various types of sales effort is due for very careful analysis in the next few months. Not only must *sales* be increased—the big point is to increase *profitable sales.* Sometimes the critic brings to focus economic trends more forcefully than the economist can hope to do. Something of this kind appeared to us to be the case when we read the following by J. R. Sprague in the *American Mercury:*

> "I doubt if business that depends too much on salesmanship for its profits is on the soundest of foundations. Breaking down sales resistance may bring in this year's dividends, but in the long run, I believe, it is apt to cause trouble for the seller and the buyer alike."

There is such a thing as over-emphasizing the possibilities of forcing the market. Every sane executive recognizes that fact. But the automotive industry today is thinking, not so much about merely increasing the volume of sales effort, but of making more efficient every effort that is put forth.

In the meantime the alarmists shouldn't be allowed to have too prominent a place in the automotive picture.

It is one thing to recognize frankly the troubles which lie ahead and then plan intelligently to meet or to avoid them.

It is quite another to set up an alarm and get a crowd out to look at a fire when only a little smoke is rising from a few dried leaves.

The best days of the automotive business are ahead!

TEN per cent of the manufacturers produced about 88 per cent of the passenger cars built last year.

But the remaining 12 per cent of car output was sold to the public for nearly $275,000,000. That's a lot of money.

No group of two or three companies ever has been able to get all the business in any American industry. Independents are making good profits in both the petroleum and the steel industries.

There always will be a place for the builder of cars in relatively small quantities in the automobile business. Those smaller makers who best fulfill their function of providing individuality and unusual style will be the ones to survive.

Fittest Will Survive, Chas. W. Nash Says

THE day has passed when the manufacturer can much longer fool the dealer. It seems to me that this great industry of ours has now reached a point where it is fair to say that we are at the point of the survival of the fittest. That applies not only to the automobile manufacturer, but it applies equally as well to the dealer.

The time has been when we manufacturers thought that all we had to do was to prepare a schedule, say we were going to build so many hundreds or so many thousands of automobiles in a year, say what models we were going to build, and then ship them out to dealers. If they said, "Well, we have gone the limit with what money we could borrow and we can't take more," they were met with the answer, "Unload the cars or your contract is cancelled."

I thank the Lord there is a sufficient number of dealers who have red blood in their veins and backbone sufficient to say to us manufacturers, "You no longer can treat us in this manner."

I read an ad where a fellow was boohooing the idea of the saturation point. The saturation point was reached two years ago. Don't misunderstand me. We are going to go on and sell more automobiles in the next two or three years than we sold in the past two or three years, but if you will analyze the situation you will find that there were facilities created more than two years ago to build almost double the number of automobiles that are being produced today.

EVERY automobile manufacturer ought to say, "We will regulate the production schedule of our factory in accordance with the number of automobiles that our dealer representatives can take and market at a profit." I believe that the automobile dealers have a right to be considered as partners of the manufacturers whom they represent. I know of no other way in which they can go along and be successful in this business.

The greatest menace to the industry is the used car. That it is a problem each dealer has to settle for himself. I don't believe it is a problem that can be settled by any organization or by any combination whatever. I think it is something that has to be settled by each individual.

Now, whatever has been the trouble with used cars, the dealers are to blame. That is a pretty harsh thing to say, but it is true.

THE dealer has paid $100, $200 or $300 more for the used car than he could get out of it. That is bad business. I am of the opinion that such practice is being eliminated. The dealer should buy used cars at a price which will enable him to sell them and get out whole at least. If not, he is going out of business through the used car route.

I don't want to be misunderstood with reference to what I said about factory schedules and dealers loading up on cars. Dealers should conduct their business in a businesslike manner. No dealer or distributor is a good business man unless he has goods on the shelf to sell when the selling season comes on. But I don't believe he should be compelled to stock cars by the strong-arm method. If the dealers don't know their business sufficiently well to protect their own interests and have goods on hand to sell when the selling season comes on, then they shouldn't blame the manufacturer.

It is impossible for any factory to go along through three or four of the spring months and make automobiles in sufficient quantities to meet the demands, providing we have good times. Therefore, it is necessary for the distributors and dealers to have a fair stock of goods on hand when the spring selling months come on. That they owe to themselves. But I don't believe they ever want to put themselves in the position where they are going to let anybody tell them that they have to do certain things. I don't believe that is necessary.

Strengthening of Rear Axle Drive Among Fordson Improvements

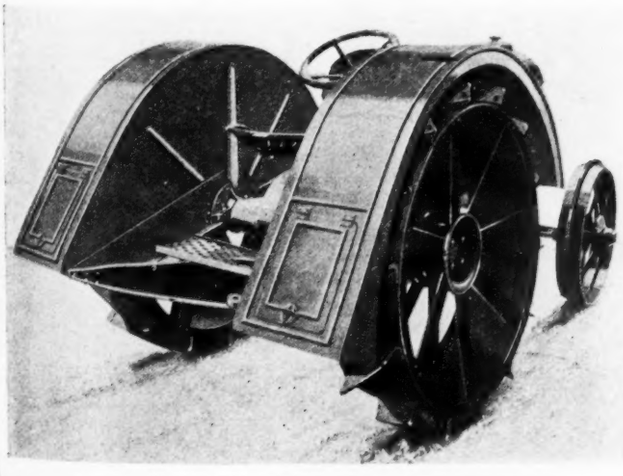
Rear wheel fenders furnished at increased cost. Chromium-silicon alloy steel valves now used in engine. Double roller bearings on worm shaft. Breather placed in dash.

By P. M. Heldt

IN the past the national tractor show afforded a good opportunity of reviewing progress in tractor design once a year. It did not seem likely that with the discontinuance of the shows—the last one was held in Minneapolis early in 1922—all mechanical progress in farm tractors had ceased. Of course, since the discontinuance of the show the industry has been unusually quiet and a good many concerns that formerly built tractors had either gone out of business altogether or else discontinued that particular branch of their business. Still, in times of a business calm it is often easier than during a boom to effect obvious improvements or introduce innovations, so it was to be expected that those concerns which survived the period of stagnation had made some improvement in their product during the interval since the last show.

Answers to a questionnaire sent out to the industry show that this expectation was fully justified. Few are the concerns that replied they had not made any changes in their design. Some improved their machines in details in the light of accumulated field experience, while others almost completely redesigned their line or added new models to round it out.

Between 1916 and 1921 the tractor industry passed through a period of very rapid development. Owing to the high prices of agricultural products and the scarcity of farm labor during the war, the demand for tractors rose rapidly, and good prices could be obtained. This brought about a rapid expansion of the industry, and with increasing returns from production and increasing competition mechanical improvements came at a rapid rate. Considering the short time that there had been any real production, the farm tractor had attained to a high state of engineering perfection in 1921 when the slump in the market came.



Rear view of tractor showing fender and platform equipment

One thing that has helped to support the industry during the years of depression is the widespread industrial use of which the farm tractor has been found capable. Among these uses must be included that of road building. Application to industrial work has necessitated more or less redesigning in some instances. In many cases the tractors in industrial service are shod with rubber tires and they then require special wheel equipment.

A good many tractors have been provided with a power take-off during the last few years. This is entirely distinct from the pulley for belt work and serves to derive power from the engine while the tractor is moving, for such auxiliary operations as running the mechanism of a grain binder or of a corn picker.

New Tractor Activity

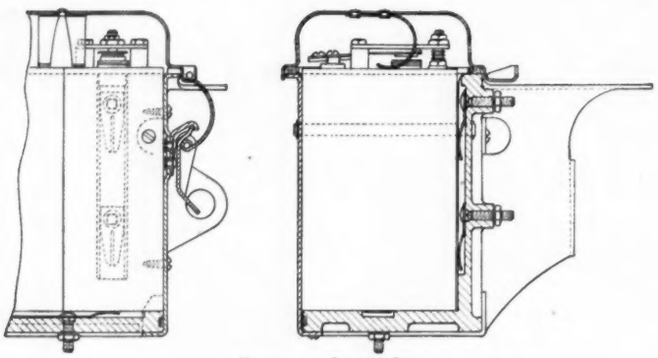
Quite recently the tractor market has shown renewed activity, and this has encouraged several of the tractor makers to lay down new designs and carry on a certain amount of experimental work. Production on these new models, however, is not likely to start until the end of the year. It is therefore quite likely that there will be some rather important announcements in the tractor field at the end of 1925 or early in 1926.

In the following are described the improvements which have been made in the Fordson tractor in recent years. Reviews of the improvements made in other tractors will follow in later issues.

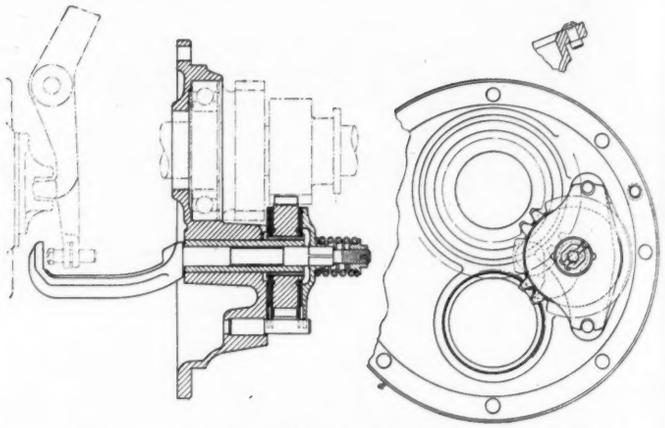
The engine of the Fordson tractor as it leaves the factory is not provided with a speed governor, but such governors have been placed on the market by various concerns, and the Ford firm, therefore, provides a small flange on the forward end of the mixer chamber for mounting a governor. Instructions were issued to service men for mounting the governor, and it is recommended that the latter be so adjusted as to keep the engine running at about 1000 r.p.m. The throttle lever on the steering column can still be used to reduce or increase the speed, by moving it against the force of the governor.

An improvement was made in the worm gear rear axle drive whereby that drive was considerably strengthened. The steel worm now has three instead of two leads, and the wheel 51 teeth instead of 35. The elimination of the so-called hunting tooth in the wheel is claimed to have resulted in the teeth on the wheel wearing more uniformly smooth. The worm itself was increased in diameter and thereby strengthened, and it is figured that the tooth pressure has been lowered 27 per cent. The driving splines on the worm shaft were increased in depth by 75 per cent.

Originally the Fordson tractor was put out without



Improved coil box



The new transmission brake and its operating mechanism

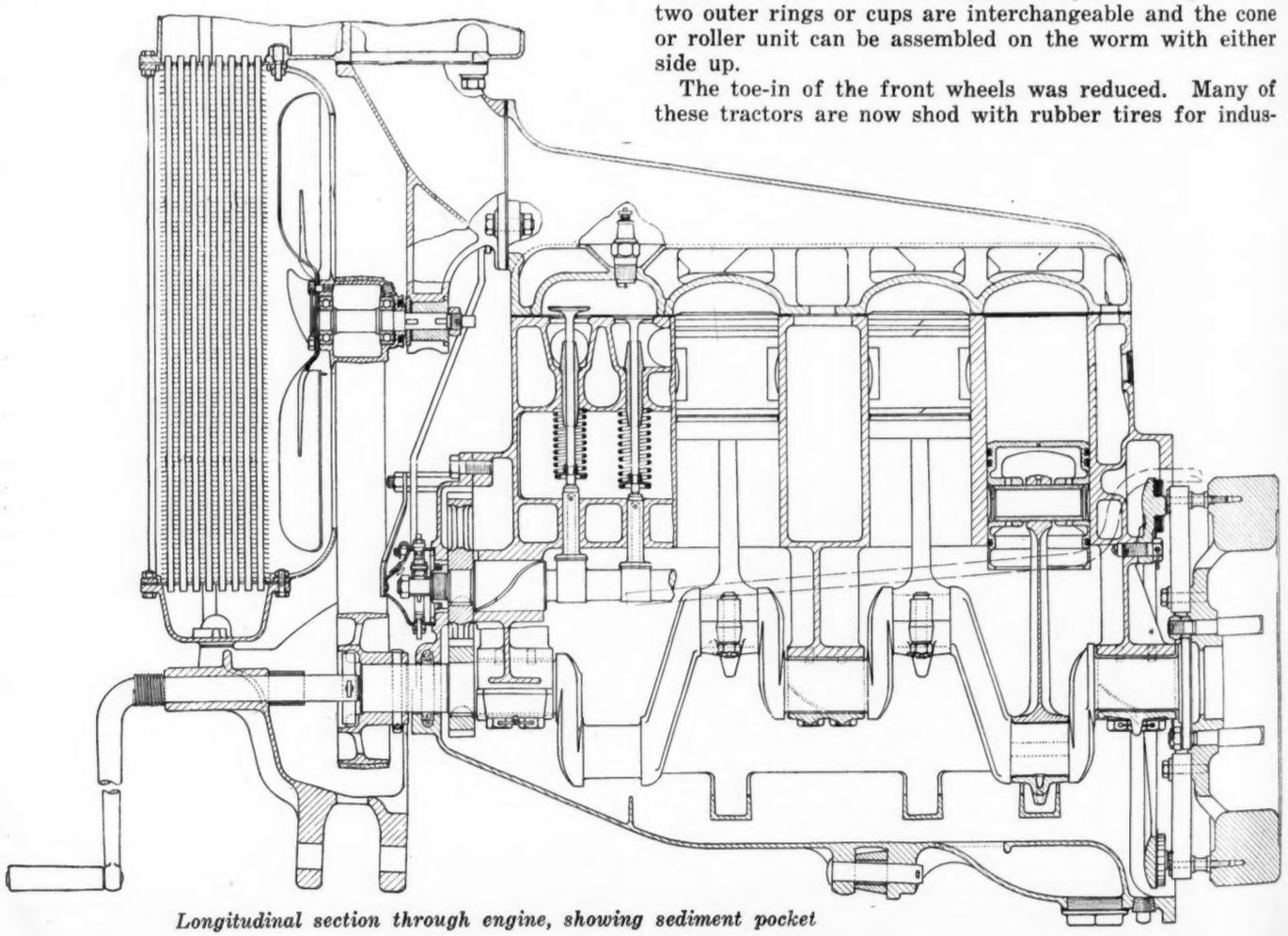
fenders, but a design of fender for the rear wheels was developed and these fenders are now furnished with the tractor at a slight increase in price. The equipment offered comprises, in addition to the fenders, a platform for the driver to stand on, and a tool and spare part box. The advantages claimed for this equipment are as follows:

It prevents mud and dust being thrown by the wheels on the driver and the engine; protects the driver from injury by the wheels and cleats; provides a convenient box for tools, spare parts, etc.; prevents the tractor from sinking into mud, sand or soft ground beyond a certain depth; provides a platform of considerable size, which is a convenience to the driver in getting on and off the tractor, offers him an opportunity to stand up and rest at intervals without getting off the tractor, and provides a carrying space for grain or chains or helpers.

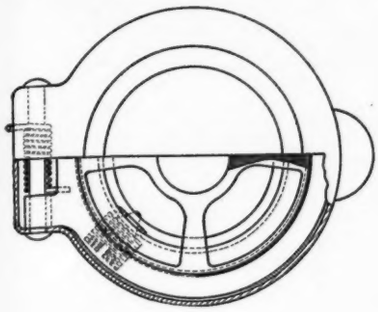
Chromium-silicon alloy steel valves are now used in the engine. Valves of this material, with its high resistance to pitting, are particularly desirable in a tractor engine, which, owing to the heavy duty service, operates at considerably higher temperatures than automobile engines. The valves are heat-treated, hardened and ground, with the result that wear at the end where the stem comes in contact with the tappet, and within the valve stem guide, is greatly reduced, as compared with the type of valve formerly used. This means longer valve life and less trouble with carburetion due to air leakage past the valve stems. Removal and installation of the valves is facilitated by the use of a split collar with the spring washer, instead of a pin.

In the original design of the tractor ball bearings were used on the worm shaft, but these were later replaced by double Timken roller bearings of a special design. The two outer rings or cups are interchangeable and the cone or roller unit can be assembled on the worm with either side up.

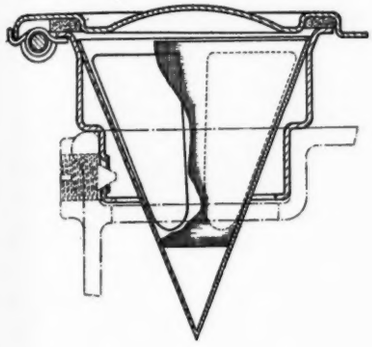
The toe-in of the front wheels was reduced. Many of these tractors are now shod with rubber tires for indus-



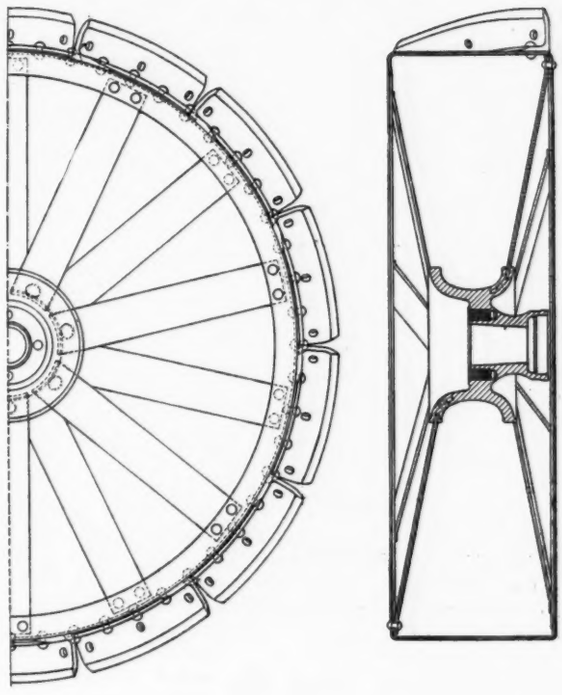
Longitudinal section through engine, showing sediment pocket



New design of oil filler



New rear wheel design



trial service, and with the larger toe-in there is no undue wear on the front tires. The wheels are now set so the front tires are ¼-in. closer together at the front than at the rear.

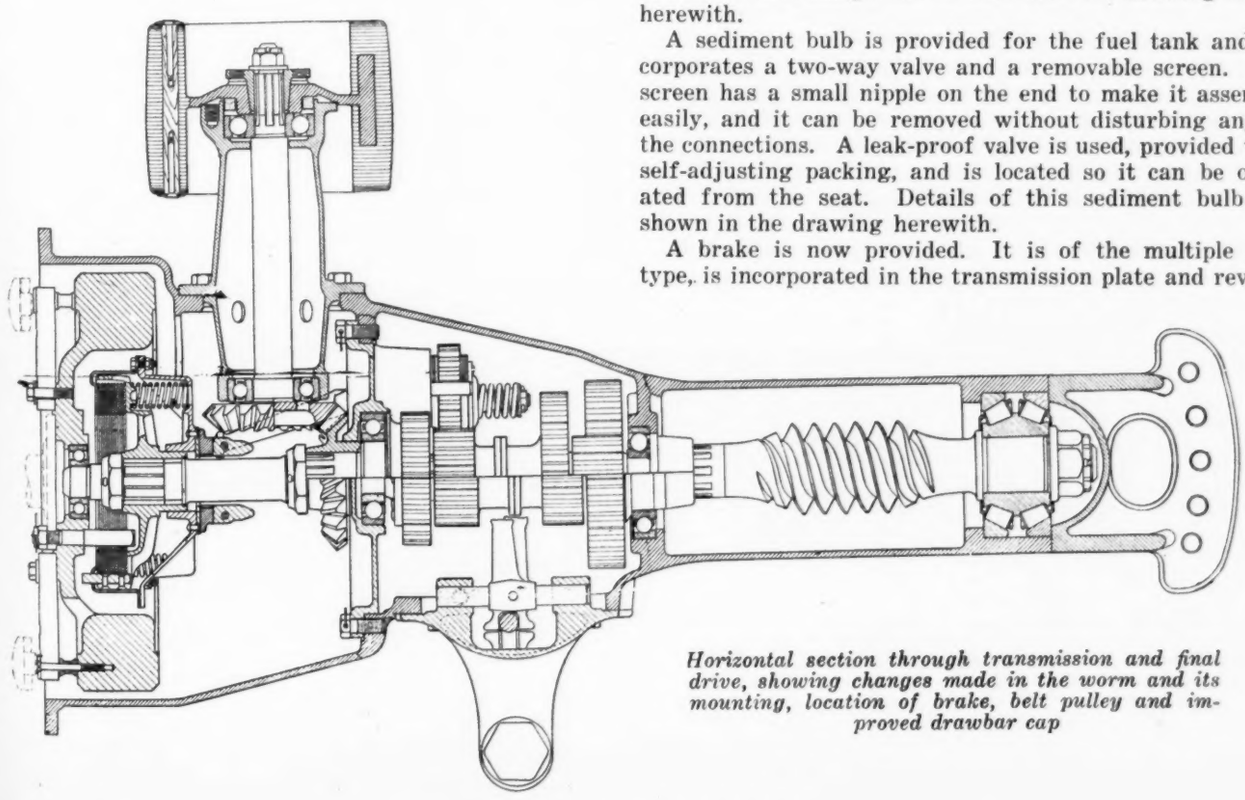
The width of the cams of the engine was increased from ⅞ to 1⅛-in. to increase the wearing surface.

A new dust-proof and water-proof coil box is now furnished with the tractor. Both the bottom and the back are made of reinforced heavy rubber, and tight joints are assured by the use of felt packings and cork gaskets between the cover and box. An improved type of hold-down springs are placed in the cover, these holding the coils tightly against the box contacts, thus insuring good electrical connections. A trough is provided at the back of the coil box cover to prevent water from reaching the terminals at the back of the box. Attention may be drawn to the cork gasket between the box and the cover.

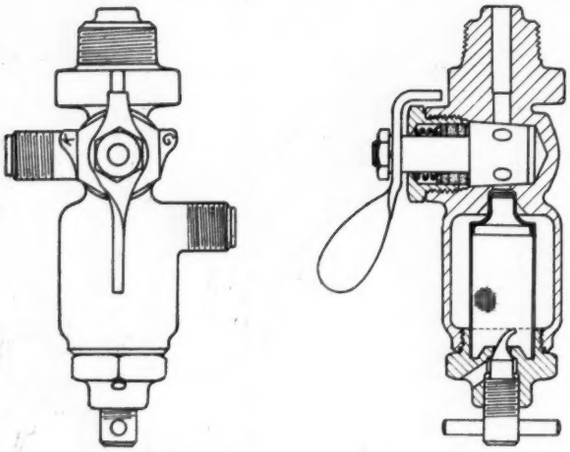
New rear wheels of the same general type as the earlier ones are now used. These wheels have seven instead of six spokes and weigh 45 lb. more each. The hub is in the middle of the wheel instead of being offset to one side, which change has equalized the load on the spokes. The cleats, which are riveted to the rim of the wheel, have holes in them for attaching grousers. Other features of the new wheel design can be seen from the drawing shown herewith.

A sediment bulb is provided for the fuel tank and incorporates a two-way valve and a removable screen. The screen has a small nipple on the end to make it assemble easily, and it can be removed without disturbing any of the connections. A leak-proof valve is used, provided with self-adjusting packing, and is located so it can be operated from the seat. Details of this sediment bulb are shown in the drawing herewith.

A brake is now provided. It is of the multiple disk type, is incorporated in the transmission plate and reverse



Horizontal section through transmission and final drive, showing changes made in the worm and its mounting, location of brake, belt pulley and improved drawbar cap



Sediment bulb on fuel tank

idler gear sub-assembly, and is operated by the clutch pedal after the clutch has been disengaged. This brake can be applied whether the gears are in neutral or in any other position.

The breather is now located in the dash, where it is better protected against dust than it was in its former location. A new design of oil filler is now used. This has a large screen, which allows the oil to flow in rapidly. The cover is self-closing, is held closed by a spring, and is dust-tight. This oil filler is made of sheet metal and the method of holding it in place in the engine casting, as shown in the drawing, is worth noting.

A large sediment chamber is now provided in the crankcase. This is so located that the engine oil constantly passes across the entrance to it, so that any sediment will drop into it.

Most of the large castings, including the transmission housing, differential housing, drawbar cap and cylinder block, are now made of what the Ford company refers to as its Grade A iron, which is really a semi-steel. A change has been made in the design of the drawbar cap, which is now provided with lugs and a large hole to permit of inserting a rope or the hook of a towing chain.

Minor improvements include the adoption of a new style rubberized fan belt, which has longer life, improvements in the heat treatment of various parts and heat treatment of the front axles to a Brinell hardness of 255-302.

Tables of Physical and Chemical Constants

AT the meeting of the International Union of Pure and Applied Chemistry held in London in 1919, the American delegates submitted a proposal for the international compilation of critically prepared tables of the physical properties of chemical substances and technological materials. The proposal was approved by the Union, and the American National Research Council at Washington has since assumed the financial and editorial responsibility for the undertaking. A Board of Trustees has undertaken to raise the sum of $200,000, or such part thereof as may be necessary. The editorial responsibility is invested in a board of editors, the editor-in-chief being Dr. E. W. Washburn, formerly professor of physical chemistry at the University of Illinois. To insure the international character of the tables, corresponding editors have been appointed in the principal countries of the world.

The work of critically examining the data and of compiling the various tables is being carried out by well-known chemists, physicists, engineers, etc., some three hundred in number, who have been chosen for this purpose in the various countries of the world largely on the basis of recommendations from the corresponding editors and their advisory committees. These experts are not being expected to assume the responsibility of searching the literature, a task which is being carried out in the main by the editorial staff at Washington, but rather to assemble, to examine critically and to select the best value for each constant, indicating at the same time the probable uncertainty.

Each portion of the tables will be published over the name of the cooperating expert who has assumed responsibility for the selection, reliability and accuracy of the data in question. The size of each assignment has been restricted so that the work may be carried out within a reasonable time and without becoming too great a burden for any individual—or cooperating group of individuals—to bear. The main language employed in the tables will be English, but the introduction, table of contents, definitions, general explanatory text, and a very complete index will be in English, French, German and Italian.

The tables will contain all available information of value concerning the physical properties and numerical characteristics of: (a) Pure substances; (b) mixtures of definite composition; (c) the more important classes of industrial materials; (d) many natural materials and products; and (e) selected data for certain bodies or systems, such as the earth and its main physical subdivisions, the solar and stellar systems, and certain biological organisms, including man. Publications of the world in many languages have been searched for data, and much unpublished information has been collected.

For pure chemical substances the data will be assembled in tables of properties, but a certain amount of latitude and duplication will be permitted in some instances, and tables of materials will be employed where they prove to be more convenient. In some cases no definite value of a constant can be put down, but only upper and lower limits. In other cases a graph may be the best means of indicating the variation of the particular property in question.

The tables will be issued in a series of volumes comprising a total of about 2500 pages—10 in. by 7 in.—publication extending over about a year and a half. The progress made has been such that the first volume is now in the press and may be expected within a short time.

THERE has been a very rapid development of motor bus transportation in Holland during the past two years, as is shown by the fact that whereas in October, 1922, there were as yet only 11 motor omnibuses in service there are more than 1800 at the present time. Most of these are operated by small owners, there being a total of over 500 operators. Complaint has been made that there is an entire absence of system with respect to the routes served and to remedy this state of affairs an Association of Owners has been organized which has set itself the task of creating a complete network of omnibus lines serving the whole country. The Association is now looking for a suitable motor bus for these services. A moderately powerful bus with a capacity of from 16 to 30 passengers is desired. The president of the Association is H. M. P. van Emmerik of Franz Hals Straat, Hilversum, and the secretary A. de Jong, Soestdyksche Straatweg, 10, Hilversum.

Just Among Ourselves

Improving the Used Car Situation

HOW is this for a used car plan? The manufacturer might provide for his dealers forms which are to be filled in every time the retailer appraises a car offered in trade, whether a new car sale results or not. It might be required that these forms be forwarded to branches or distributors handling the particular territory. The latter could check up returns from various dealers and could tell which retailers were trading their heads off and check them up accordingly. It is said on good authority that one important car maker is trying out such a scheme at the present time, so we don't deserve credit nor take responsibility for thinking it up.

Used Cars Can't Be Destroyed

A WESTERN dealers' group has suggested that the used car problem be solved by having the vehicle manufacturers buy all used cars from dealers at a maximum price of $100 and then destroy the cars. They suggest that the number of cars repurchased on this basis be limited to 20 per cent of each year's production and that $20 be added to the price of each new car to care for the cost of the scheme. Honestly, we can't get much excited about any of the simplified panaceas for the used car problem. Its roots are sunk in fundamental business movements and its acuteness can be relieved only by applying to the question the same sound economic principles which operate in all business activities. So long as a car is good enough to be used, to destroy it means the destruction of economic value and no industry can hope to operate any plan which contemplates such destruction. Every part of an industry must build, not destroy, economic value.

Blacks, Whites and Shades in Automotive Economics

IT'S a great thing to be able to see one thing in relation to another. Most of us can't do it without a struggle. All kinds of merchandising, editorial and oratorical effort constantly is being used to get us to see the merit of some particular phase of each business problem. It's much easier to arouse interest by taking definite sides than by analyzing clearly and weighing all the factors. Some people still picture the automotive industry as being on its way to glory without anything worth talking about in the way of troubles to hinder it. Others see it as on the verge of catastrophe with only a slight shove necessary to precipitate all sorts of terrible economic consequences. But the true status of the industry isn't represented by any extremist view. Serious problems confront automotive executives. Every sane man realizes that. But basic conditions show more signs of stability than ever before. A true picture of anything nearly always contains lights and shades.

Roadster Coming Back to Life

THE roadster bids fair to take a new lease on life. With the closed car the general utility model and open cars being used primarily for sport and pleasure driving, the beauty of line and suggestion of speed which characterize the roadster probably will gain in popularity. Certainly the obvious effort which has been put into roadster design during the last three months indicates that car makers have some such idea of the future of this model.

Possibilities Offered in Car and Chauffeur Hotel

AN innovation in garage construction has been started in Berlin. It is a combination hotel and garage for chauffeurs and cars, and construction has already begun on the building which is to cost $1,000,000. A fireproof section is provided for gasoline, lubricants and repair shop. Accommodations are provided for 200 men and twice that number of cars. All the owner will have to do is telephone the garage and he will find driver and car ready to start at a moment's notice. The hotel is located a short distance from the best residential sections.

Groundhog Predicts Good Spring Sales

WELL, Mr. Groundhog didn't see his shadow this year—at least he didn't in New York—so one more good omen for spring business has been added to the list which automotive men have been compiling for the last few months. The weather man certainly took an awful wallop at the automobile business last spring and he's about due to schedule a lot of sunshine early in 1925 to make up for his leap-year deliquencies. In view of how badly he treated the industry in 1924, it would only be fair for him to assume the burden of the used car problem and stand responsible for its solution.

Extra! Parking Problem Solved!

A NEW suggestion has been developed to solve the parking problem. It is understood that manufacturers will be urged to supply a bicycle with every car sold so that the owner readily can get from the place he parks to his original destination.

—*N. G. S.*

Chassis Lubricating System Developed by Bijur Is Ready for Market

Oils all chassis bearings from central reservoir and hand pump producing 55 lb. per sq. in. pressure. Terminal fittings meter oil delivered at each outlet point.

By Herbert Chase

SINCE retiring from the electrical equipment business, Joseph Bijur has been engaged in the development of a chassis lubricating system. The results of his work were described by him in a paper presented recently before the Detroit Section of the Society of Automotive Engineers. This system is to be marketed by the Bijur Lubricating Corp., of 250 West Fifty-fourth Street, New York.

It consists essentially of a central reservoir with a hand pump delivering oil through a system of 3-16-in. tubes to all parts of the chassis where lubricant is required. The primary difference between this and other systems of the same general character lies in a special form of drip fitting for use at outlets, certain details of the tank outlet and pump and the substitution of coils of brass tubing for flexible tubes where it is necessary to bridge gaps between such parts as axles and chassis frame which have considerable relative motion.

Oil enters the system from a tank bolted to the front side of the dash. To the base of this tank, shown in Fig. 1, is attached the hand pump placed in such position that the operating handle comes just under or projects through the instrument board within easy reach of the driver. As the pump plunger is pulled outward oil is drawn from the lower or valve chamber of the tank and enters the pump cylinder. At the same time the return spring is compressed so that when the handle is released the plunger descends slowly, and oil is forced into the distributing pipes, the valve at the base of the tank proper being held shut by the oil pressure.

Spring pressure is maintained over quite a period of time, until the lower end of the plunger seats against a leather gasket and closes off both inlet and discharge openings of the pump. The closing period ordinarily is about one minute, but varies with the viscosity and consequently with the temperature of the oil, so that in cold weather as much as ten minutes sometimes is required for the plunger to seat itself.

During this period the pressure is said to average about 55 lbs. per sq. in. at the pump outlet and to be maintained within limits of about 5 lbs. from the mean. Should any oil get by the leather cup pistons of the pump it drains out through holes near the upper end of the cylinder wall into an outer sleeve and thence drips off at a point forward of the dash.

Air Excluded from System

Should the oil tank be empty, air drawn into the cylinder is discharged back into the tank, since the valve just below the tank proper will not close. In this case the piston and its stem will move rapidly to the closed position, so that the operator is warned that the tank needs filling. Normally no air will get into the piping, but if this occurs and the air is compressed, tending to force oil back into the tank, such backward flow is prevented by a ball check in the line just below the pump discharge. In consequence the air soon is expelled from the system.

Oil poured into the filler opening of the reservoir passes through a fine mesh gauze bag into the upper compartment of the tank and then filters through a dense felt diaphragm into the space below, the air beneath the felt

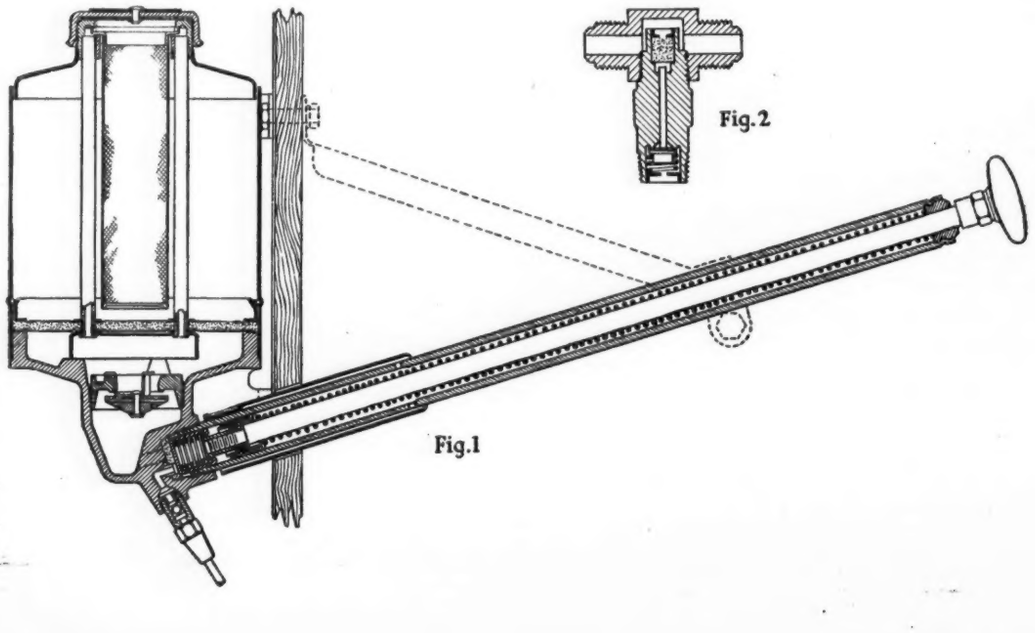


Fig.1

Fig.2

Fig. 1 — Reservoir and hand pump of Bijur lubricating system are mounted on dash. Fig. 2—Outlet fitting, termed drip plug, designed to filter and meter oil entering bearing and to prevent flow of oil except when system is placed under pressure by pump

escaping through two vent tubes shown in Fig. 1. This assures clean oil and prevents the system from becoming air bound.

Oil discharged from the pump enters a leader from which the main distributing lines radiate. Usually there is one line along each side of the frame, one to steering gear and one to parts of the gearset. Each of these lines can have as many branches as desired, but at each outlet point there must be a drip plug, such as that screwed into the branch opening of the T shown in Fig. 2. The function of this fitting is to control the rate of discharge. It is made as follows:

A hole, 1/16 in. in diameter and ½ in. long is nearly filled with a pin. The annulus between the pin and the hole forms the oil passage and the size of this passage can be varied by varying the size of the pin used. This passage offers considerable resistance to oil flow. At the outlet of this opening is a spring loaded check valve resting against a gasket of soft material impervious to oil. The phosphor bronze spring which holds the valve against its seat exerts a pressure such that the valve opens when subjected to a pressure of about 12 lbs. A perforated cap retains the spring at the outlet end and at the other end a felt strainer plug supported by a gauze cup is retained by a similar cap. This filter prevents any particles of dirt in the oil from lodging on the seat of the relief valve and thus keeping it open when it should be closed.

Total pressure drop through the relief valve and annular opening around pin is about 15 lb.—enough to prevent leakage, except when the pressure on the line exceeds this amount. Hence, if a total of 55 lb. is applied by the pump, 40 lb. is available for forcing oil into and through the bearing. The quantity of oil discharged per minute when difference in diameter between metering hole and pin is 0.002 in. is about 0.15 cc. or roughly three drops. With a difference in diameter of 0.004 in., the flow is about 8 drops and with a difference of 0.007 in. is about 30 drops per minute.

Metering Pins Control Oil Flow

Use of the metering pins makes it possible to control the flow practically independently of the fit of the bearing to which oil is being fed. With a T fitting such as that shown in Fig. 2 the pressure can be carried past the discharge point to as many other openings as desired, due to the fact that pressure in a hydraulic system of this kind is substantially uniform at all points so long as the rate of flow is low, as it is in this case.

When it is necessary to carry oil to points on the axles which are subject to considerable motion in reference to the frame of the chassis, coils of brass tubing

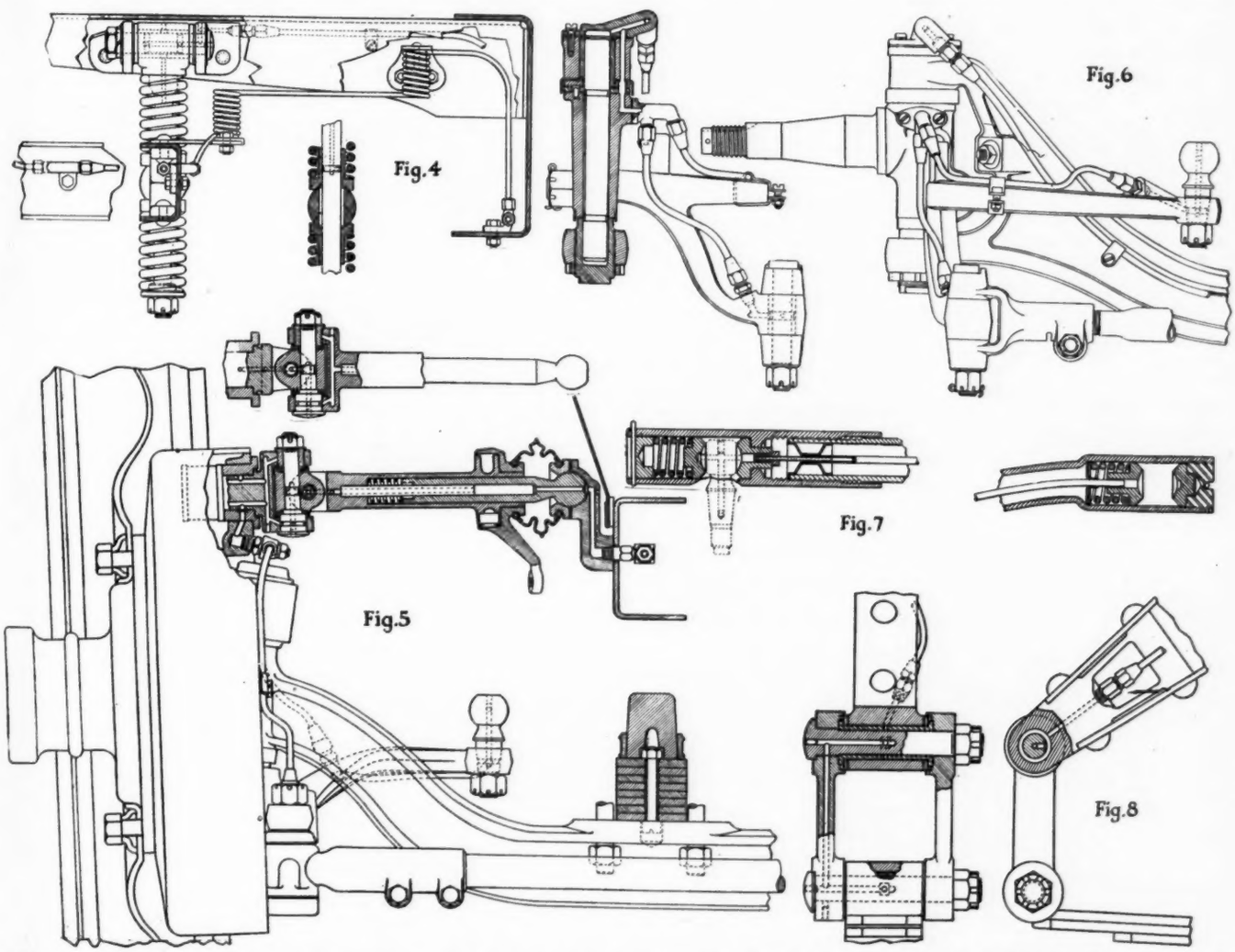


Fig. 4—Connections at torque arm support. Tube can be run along torque arm to rear axle if desired. Fig. 5—Front axle and brake showing how oil is carried through brake operating shaft and universals to various points on axle. Fig. 6—Another front axle design showing tubes carried to various parts. Fig. 7—Drag link with tube for carrying oil from end to end without interfering with assembly and dismantling of parts. Fig. 8—Spring shackle with connections for carrying oil to both pins

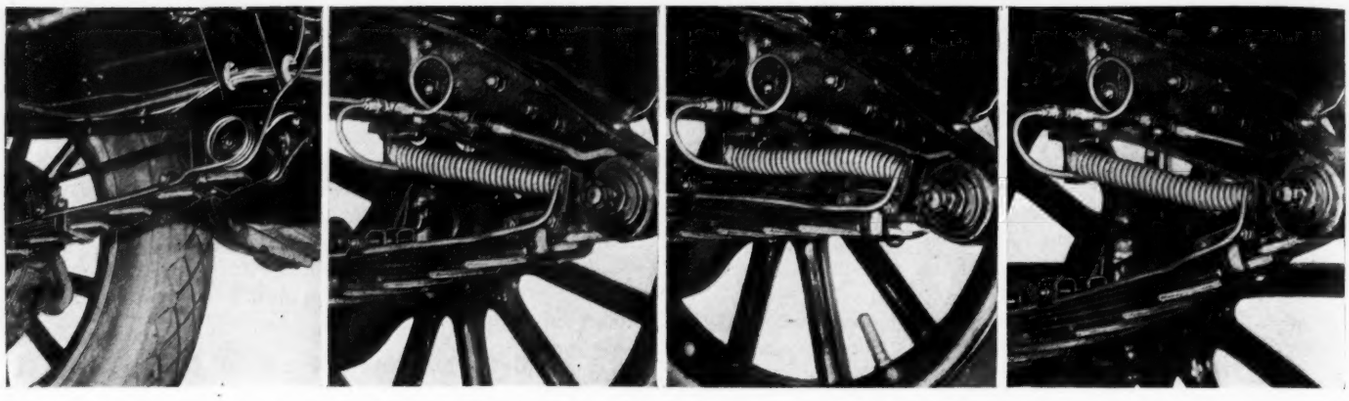


Fig. 3—Arrangement of piping used at front and rear springs to connect frame with axle parts. Helical coils, supported on special studs, are designed to permit necessary flexing without localized strains. Front spring is shown in normal and two extreme positions

wound in the form of a helix are employed to avoid localized stresses in the tube and flexing beyond the elastic limit. These coils are supported by suitable studs and are disposed in different relation in respect to the direction of motion in various installations, some of which are shown in Figs. 3 and 4.

Fig. 3 shows two arrangements used at front and rear springs, that at the front being photographed with extreme and normal spring deflections. Fig. 4 shows a connection from frame to torque arm. In this case a tube can be carried back along the torque arm to the rear axle if desired.

In Fig. 5 is shown a method of carrying oil from a fitting inside the frame to the shaft operating front wheel brakes and through this shaft and its universal joint to knuckle pivots and other axle parts. In this case the spherical joint near the inner end of the shaft makes it unnecessary to use a coil of tubing to get oil to front axle parts. Fig. 6 shows another front axle installation, while Fig. 7 shows how oil can be carried through the drag link for lubricating joints at each end. In these as in other installations care is used to design the connections in such a fashion as to present minimum interference in assembly and dismantling of parts.

Fig. 8 shows a form of spring shackle designed with concealed felt washer at the end of the bushings for excluding dirt and adapted for lubrication by the Bijur system. Oil is fed direct to the upper pin and thence via a drilled link to the lower pin.

Numerous other applications to points on brake linkage, steering gear, gearset, engine, fan bearing and other parts have been made, but in all cases the drip plugs are of the same general design, each being fitted with the size of metering pin necessary to give the desired quantity of oil.

Latest Lacquer Finish Is Termed Berryloid

WITH the announcement of Berryloid enamel, another of the old line varnish manufacturers has entered the list of producers of nitro-cellulose or pyroxylin body finishes. While the final coats have the general characteristics of the usual nitro-cellulose finishes, the manufacturer, Berry Brothers, Inc., of Detroit, has devoted particular attention to the possibilities and varying requirements of both the car manufacturer and the refinishing station. The same materials are used in each field, but in view of the lack of drying ovens in the refinishing field, the longer air drying process is used.

Undercoats resemble those used with the older varnish system in both treatment and physical characteristics. Undercoats forming a part of this system, however, can be air dried, it is stated, without the usual oxidation troubles which are sometimes responsible for the subsequent peeling of the entire finish. After the enamel has been applied, an unusually high gloss can be obtained by the use of Berryloid polish, which forms a part of the complete system for either the car manufacturer or the refinisher. In preparing and mixing the final nitro-cellulose coat, a routine which tends to reduce the orange peel appearance has been developed. Consequently the rubbing time required is reduced.

Time Schedule Given

Materials which make up the complete system with the time requirements for oven or air drying are listed as follows. This treatment starts at the bare, clean metal and carries the finish through to a lustrous appearance. All materials used are of Berry Brothers' manufacture.

1. Spray coat red oxide metal primer. This coat air dries over night or in 3 hr. at a temperature of 280 deg. Fahr., or in 20 min. at 350 deg.
2. One glaze coat knifing surfacer which air dries over night or bakes in 2 hr. at 180 deg. or 15 min. at 350 deg.
3. Sand.
4. Spray coat sanding surfacer, which air dries overnight or bakes in 2 hr. at 160 deg. or in 15 min. at 350 deg.
5. Sand to a perfectly smooth finish.
6. One coat of Berryloid enamel and allow 1 hr. for air drying.

Succeeding coats can be applied at intervals of one year. After the final coat, 10 or 12 hr. should be allowed before rubbing and polishing. Berryloid polish consists of an abrasive in a wax vehicle and may be used from time to time by the car owner.

Ordinarily but two coats of Berryloid enamel are applied, but where a very high gloss is desired, a modified third coat can be applied to good advantage. As with other nitro-cellulose finishes, Berryloid enamel must be applied with a spray gun.

THE statement has often been made that the progress of a fatigue failure in steel caused by repeated stresses is accompanied by a corresponding change in magnetic properties. In view of the fact that there is no record of any experimental verification of this statement, the Bureau of Standards is undertaking to study the effect of fatigue on the magnetic properties of steel.

Abolished Automobile Duties Have Little Effect on English Imports

Excess of imports over exports fell to £569,880 in 1924 as opposed to £2,202,080 in 1923. 26,030 cars imported into England in 1924. Slight change in monthly average since Aug. 1.

By E. C. Petrie

ENGLISH Board of Trade returns for 1924 show that a distinct advance has been made in British overseas trade during 1924.

The value of the imports, comprising cars, cabs, trucks, chassis and parts, totaled £8,130,003; the value of re-exports was £1,046,557; of exports, £6,513,566. The corresponding figures in 1923 were: imports, £6,675,547; re-exports, £574,466, and exports, £3,899,001. The excess imports over exports fell to £569,880 in 1924, against £2,202,080 in 1923.

During the past year 26,030 cars were imported. The abolition of the McKenna duties on Aug. 1 did not materially affect the rate of increase. The monthly average for the first seven months was 2124; for the last five months, 2251.

Rubber casing and inner tube imports in 1924 came to £3,037,145; re-exports, £465,014, and exports, £2,740,-215. The 1923 figures were: imports, £3,715,309; re-exports, £199,940, and exports, £2,180,607. These figures show that exports exceeded imports in 1924 by £168,084, whereas in the previous year imports exceeded exports by £1,334,762.

It may be taken as symptomatic of the automotive growth of Britain that the imports of gasoline jumped from 327,233,670 gal. in 1923 to 422,310,541 gal. in 1924.

The Ford Motor Co. (England), Ltd., now supplies five straight-sided four-ply balloon tires and five detachable rims with all passenger models. Gear ratios are unaffected, the wheels being slightly smaller.

To counteract the effect of balloons the ratio of the steering gear has been reduced from 4 to 1 to 5 to 1, and the diameter of the steering wheel increased to 17 in. Windscreen wiper, dash lamp and rear view mirror are added to the equipment, and choice of colors can be made from Empire gray, cobalt blue and maroon. Prices remain the same.

Balloon Tires on Ford Trucks

Tires 30 in. x 5 in. are being fitted to rear wheels of Ford trucks. The detachable rim is readily removed with the aid of the special tool supplied. The light delivery can has four straight-sided balloon tires and five detachable rims. Steering gear ratios and steering wheel diameter has been altered as on passenger cars.

Morris Motors, Ltd., who has been leading the way in evolving schemes to encourage sales, has gone a step farther by providing a portable fire-proof garage for an additional cost of 15 guineas. This price includes insurance for one year, and the lock-ups can be paid for on the hire purchase system.

This move will be appreciated by the more lowly class of potential buyer in the country districts, inasmuch as garage construction is costly and lock-up rents range from 7s. 6d. to 10s. 6d. weekly. The scheme is virtually useless, however, to the same class of suburban buyer, as lock-up space is generally wanting.

Standard Motors of Coventry announce that during the past financial year they sold 9684 cars, of which 554 were exported. Of the total, 6529 were 11 hp. models and 3155 14 hp. models. The total sales amounted to £2,421,638, the profit earned being 5.9 per cent.

Packard prices have been reduced, the range of reduction being from £290 in the case of the long wheelbase salon seven-seater to £40 off of the previous price of the short wheelbase touring five-seater.

The Society of Motor Manufacturers & Traders have changed dates for the passenger car show at Olympia to Oct. 8-17 and for the commercial vehicle show to Oct. 29-Nov. 7. No show will take place in conjunction with the British Empire Exhibition at Wembley.

Vulcanized Rubber Life Increased by New Preparation

ACCORDING to an item in *Allgemeine Automobil Zeitung* a preparation has been developed which renders vulcanized rubber practically imperishable.

The valuable properties of vulcanized rubber depend upon the addition of a small amount of sulphur and the heating of the mixture to a certain temperature, whereby atoms of sulphur attach themselves to the rubber molecule. The perishing of vulcanized rubber, which manifests itself in hardening and the development of fine cracks and fissures, is a purely chemical process and is due to the combustion of the vulcanizing sulphur. At ordinary atmospheric temperatures the sulphur is slowly but surely oxidized by the oxygen of the air. The sulphur oxides thus formed decompose the rubber, so that minute cracks are formed, which increase the area exposed to attack by the oxygen.

In the case of a pneumatic tire the very considerable increase in temperature in service hastens this action. It has been found that some metals, such as copper, zinc and lead, and their oxides, which are always present in vulcanized rubber, have a strong positive catalytic effect.

Dr. G. Niese, who makes these observations in the publication mentioned, states that, according to his personal experience, this oxidizing action is very effectively checked by a preparation known as Sparegum, marketed by a Leipzig firm. This action depends upon a negative catalyst which greatly retards the aging process and almost eliminates it. This product has the same relation to the preservation of vulcanized rubber as a leather preservative has to shoe leather. The preparation contains a certain proportion of unvulcanized rubber which enables it to penetrate into any existing capillary cracks, where it is vulcanized by the heat created by road friction, etc.

New Device Equalizes Braking Torque on Opposite Sides of Car

Gless brake differential applies equalizing action to reaction on anchoring point rather than to force of application. Tends to prevent skidding and insure equal wear. For cars and trucks.

A BRAKE equalizing system by means of which the actual brake torques or retarding moments of the brakes on opposite sides of the car are equalized, and not only the forces applying the brake bands or shoes to the drums, as with the usual construction, has been developed by the United States Ordnance Co., 926 Fifteenth Street N. W., Washington, D. C. A brief description of this system of brake equalization was given in these columns on a previous occasion, but the design has recently been simplified and has been adapted to front-wheel brakes, and the new designs are illustrated and described herewith.

When a brake is applied and takes hold of the drum, it exerts a reaction on the brake support and tends to cause the latter to turn around in the same direction in which the wheel is turning. Ordinarily the brake is anchored to a part that is rigidly mounted on the rear axle housing, but in this case the bands on opposite sides are anchored to the short arms of two bell cranks which are pivoted on parts rigid with the axle. The long arms of the bell cranks, which extend substantially upward, are connected together by a link or tie rod.

It can easily be seen that if the point of anchorage of one brake band moves slightly in the direction in which the brake drum turns, the point of anchorage of the band on the other side will have to move in the opposite direction. Motion of the brake anchorage in the direction of wheel rotation naturally tends to release the brake, and motion in the opposite direction tends to set it more firmly.

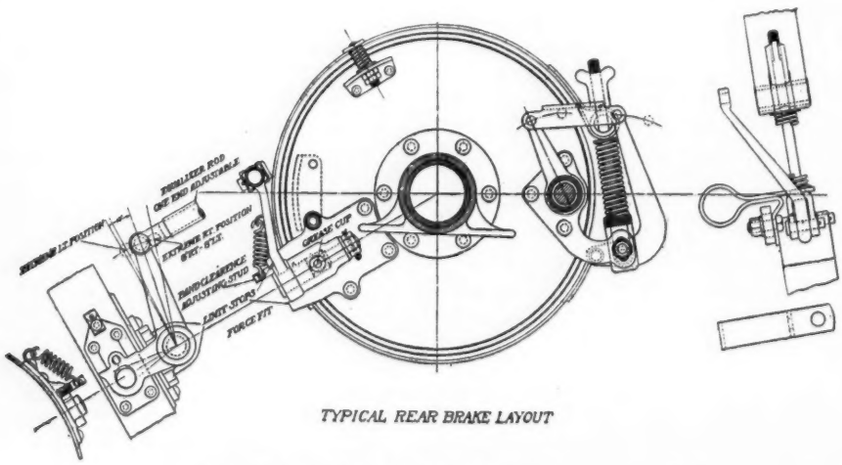
It might seem from an inspection of the drawing that a slight movement of the brake band anchorage with the drum would have no effect on the setting of the brake, as apparently one section of the brake would be tightened thereby and the other one loosened. However, it will be observed that the section which is released if the anchorage moves in the direction of drum motion is considerably longer than the other and, besides, this is the section that is being wrapped around the drum by the friction, whereas the other section is being unwound. Hence, the effect on the longer section predominates, and any motion of the point of anchorage with the drum releases the brake slightly and simultaneously sets the brake on the opposite side more tightly.

How It Operates on Slippery Ground

The torque produced by the friction at the surface of the brake drum is limited by the adherence of the tire to the road. Therefore, if one wheel should be on very slippery ground, only a small retarding torque could be developed at the surface of the drum carried by it, and as the torques on both wheels are equalized by this mechanism, the other brake could develop no more torque. To prevent loss of braking power under these conditions two stops are provided which limit the distance the brake anchorage can follow the drum. Once this leeway has been taken up, the anchorage point is fixed and the full braking torque can be obtained from the wheel with good footing.

The problem of applying the equalizing mechanism to the front brakes naturally involved increased difficulties. The design worked out is quite simple, however. The bell cranks are pivoted on downward extensions of the knuckle pivot pins. The short arms of the bell cranks extend outward and carry a downwardly projecting crankpin which engages into a seat on a pad riveted to the brake band. This seat surrounds the pin only halfway, so that the pin will be picked up by it when the brakes are applied while the car is running forward, but not when the car is running backward.

The knuckle pin extends beyond the hub of the bell crank into an elongated bearing formed in the pad riveted to the brake band. This extension serves to anchor the band for braking rearward movement, but does not come into play for braking forward motion unless the bell cranks swing to the full throw either right or left. This elongated bearing also permits an unequal movement between the band and bell cranks resulting from the differences in the angular movements of the two wheels and the two bell cranks in following a curved path. This difference is partly due to the inward slant of the steering knuckle arms and partly to the inward slant of the long arms of the bell cranks. The latter point inward



Application of Gless brake differential to rear axle

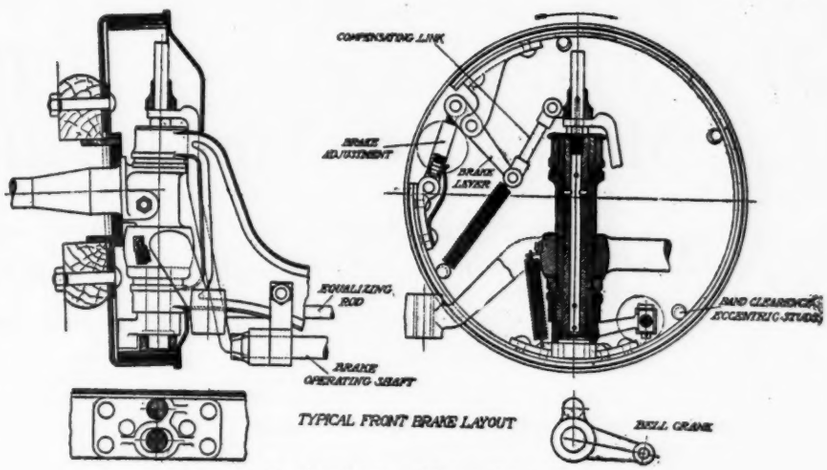
and forward, and the length of the cross rod is less than the distance between knuckle pins, so that a change of leverage will take place in rounding a curve, thus causing the equalizing mechanism to balance a smaller braking torque on the outer wheel against a greater torque on the inner one.

For oiling the bell crank assembly provision was made whereby the important parts of the brake-setting mechanism and the bell crank pivots are lubricated (greased) by the same connection through which lubricant is supplied to the knuckle pin bearing. This is said to prevent trouble as long as ordinary care is exercised in greasing the car. Another advantage is that no extra connection is required.

The assembly of the parts is quite simple. After the wheel has been taken off it is only necessary to pull out one pivot pin and unhook two springs to make it possible to remove the brake band for inspection or relining.

The advantage of having wheels on opposite sides of the car develop equal braking torques are obvious. Provided the brakes are not locked, the tendency to skid as a result of brake application is eliminated. Moreover, the brakes will wear evenly and heat up equally.

In connection with the equalizing device for the front brakes the following claims are made by the manufacturers: The steering mechanism is relieved of all stresses generated by the brakes, since one band pulls against the other. Steering tie rods need to be no stronger than usual. Owing to the balancing action of the brake forces, axles are stressed to a less degree and in a more uniform manner. The equalizing action eases up the sudden changes in torque which would otherwise take place between the right and left brakes. Shimmying troubles, believed to be partly due to the inclined knuckle pins and balloon tires, will be avoided, and, above all, a more uniform performance of brakes must necessarily follow.



Application of brake differential to front axle

Effects of Sulphur, Phosphorus, Carbons, Manganese and Silicon in Steel

ALL ordinary wrought steels—that is, carbon steels—contain, in addition to the iron and carbon, manganese, sulphur and phosphorus, and cast steel contains silicon in addition to the other components mentioned. To those not familiar with metallurgical work an explanation of the reasons for the presence of these different components in the steel may be of interest.

Sulphur and phosphorus are impurities, and the steel would be better if they were completely eliminated, but this, unfortunately, cannot be done commercially. All that can be done is to hold the contents of these injurious components down to permissible maximum limits. Sulphur has a tendency to cause red-shortness, that is, to cause the steel to crack while contracting in cooling. It has been found, however, that when the sulphur is held down to 0.06 or 0.05 per cent its deleterious effect in this respect is negligible. Therefore, in steel specifications the sulphur limit generally is set at either 0.05 or 0.06 per cent.

Phosphorus when present in considerable proportion makes a steel cold-short, that is, brittle at normal temperatures. This effect can be reduced to permissible limits by keeping the phosphorus content to within 0.05 per cent.

Of all the elements in steel, carbon is undoubtedly the most important. In fact, it is the presence of the carbon in the iron that gives the characteristic steel properties. These properties vary with the percentage of the carbon. Carbon has a direct influence on the fluidity of the steel, which explains why cast iron, with a total carbon content of 3 per cent or more, pours much better than cast steel, with a carbon content of less than 1 per cent.

Another effect of the carbon is to increase the tensile strength and elastic limit of the steel. Each additional point of carbon, within limits, increases the tensile strength of the steel in the annealed state by approximately 1000 p.s.i. On the other hand, the elongation and the reduction of area are reduced with an increase in carbon. Increase in carbon, therefore, makes the steel harder and more brittle.

A further effect of the carbon is to make steel more responsive to heat treatment. Quenching from a temperature above the critical point makes a steel hard and brittle, and this effect is much more pronounced in high carbon than in low carbon steels.

Manganese has an effect somewhat similar to carbon. Like carbon, it makes the steel more responsive to heat treatment, and in order to obtain the same result from heat treatment, if the manganese content is increased the carbon content can be decreased. It is also claimed that manganese helps in eliminating injurious oxides from the molten steel and thus to facilitate the production of sound castings.

Silicon is the element in cast steel on which the steel founder depends chiefly for the deoxidation of the steel and the prevention of blowholes in the castings. It also increases the fluidity of the metal and makes it possible to cast comparatively thin sections.

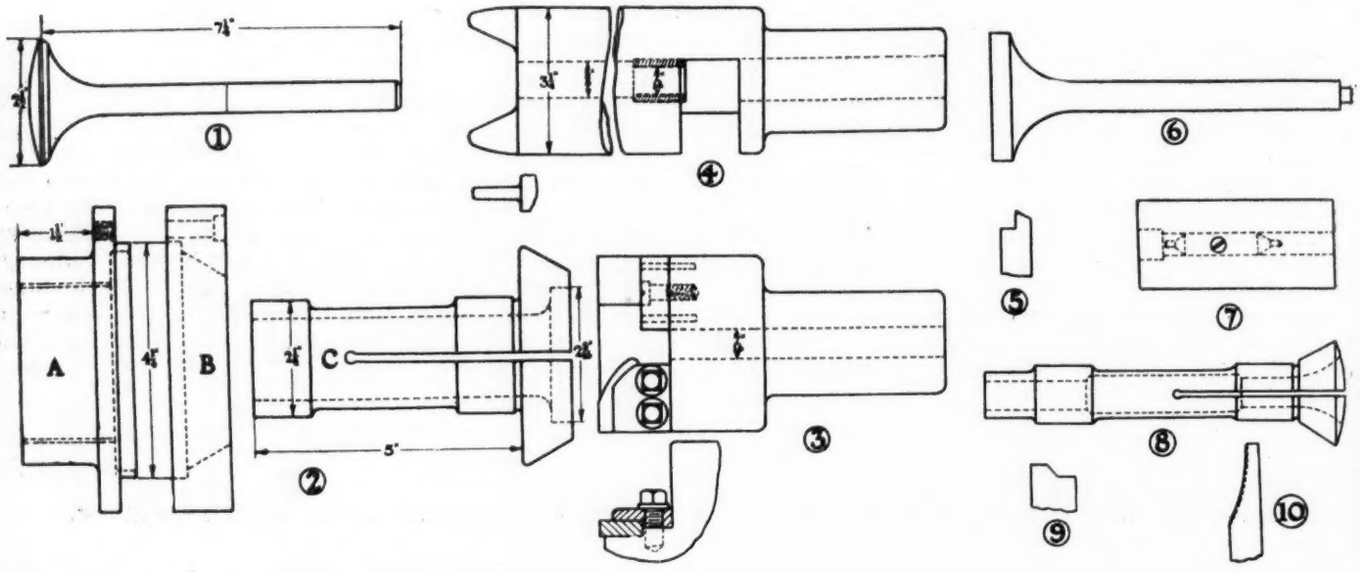
OF the 84 exhibitors at the Geneva Motor Salon, opening March 20, France will be represented by 30 makes; America, 20; Italy, 11; Great Britain, 10; Switzerland, 7; Germany, 3; Belgium, 2, and Austria, 1.

British exhibitors are Rolls-Royce, Sunbeam, Daimler, Wolseley, Rover, Standard, Morris, Humber, Bean and Swift, indicating revived interest in Continental markets on the part of British makers.

How Forged Nickel Steel Poppet Valves Are Machined on Turret Lathes in England

Drop forged blanks have large fillet under head which is finished by means of radius tool. Machining done on lathe with special equipment at rate of one valve per six minutes.

By T. H. Hargrave



THE accompanying sketches illustrate the tools designed for the production of gasoline engine valves of the type shown at 1. The valves—made from nickel steel forgings—are machined on the turret lathe and are finished complete, except for an allowance for final grinding to size after hardening on both the stem and on the taper seat. The first operation consists of facing the top face, flat turning the top to 2 9/16 in. diameter, for holding purposes in subsequent operations, and roughing out the 1¾-in. radius behind the seat. The forgings are held in an ordinary 9/16-in. spring collet, the only special tool required being a radius tool held at the back of the cross slide. The same tool is used for facing as for turning the top diameter.

For the succeeding operation, that of turning the stem and finishing the radius, the special chuck and collet shown at 2 is used. Of the two parts, A is threaded to suit the thread on the lathe spindle. Secured to it by three fillister-headed screws and locating off the spigot, the part B is in turn bored to suit the taper on the collet C. This is recessed at the front so as to grip the top diameter of the valve previously machined. The next step in the operation consists of chamfering the end of the stem to give a start to the roller turning tool, this being done by means of a hollow mill tapered out at the front to 45 deg. Following this, the stem is turned, leaving the grinding allowance, the correct distance being obtained by means of the turret stops.

For the next process, that of finishing the 1¾-in. radius, the tool shown at 3 is brought into operation. Broadly speaking, this consists of a steel barrel, turned down to suit the turret holes and bored with a hole which is a running fit on the valve stem and thus acting as a steady while the radius tool is cutting. The front of the tool holder is cut away as shown to accommodate the radius tool, held in position by means of the clamp and screw illustrated. With the machine running in low gear and a good supply of lubricant, a most satisfactory finish was obtained. It will be appreciated that with tough material, such as nickel steel, to deal with, this is not always an easy matter.

For Cutting Off Stems

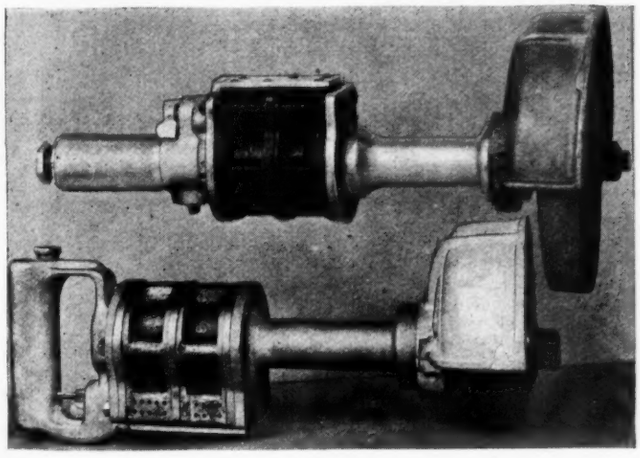
For cutting off the stem to length, the tool shown at 4 is used. This is of somewhat similar construction to the last tool, except that the front face is cut down and recessed to form two bearing points on the 1¾-in. radius. A ¾-in. hole is bored through and a hardened steel bush inserted from the rear to such a distance from the front that when the edge of the parting tool bears against the end face of the bush, the valve is parted off to the correct length. The tool is, of course, milled away, as shown, to allow the parting tool 5 to enter. During the parting off process, a pip ¼ in. diameter by ⅛ in. long is formed on the end of the valve, in which later on a center hole is put for use when grinding. The appearance of the valve at this stage is shown at 6. It may be observed that the pip just mentioned is eventually ground off, as it is essential that the end of the valve be quite flat.

The next operation of centering brings into use the

the holder shown at 7, recessed about ½ in. up for a running fit on the valve stem. The correct depth of center is obtained by the inner face butting against the shoulder of the valve. This insures that each valve shall be drilled the same depth, and, furthermore, that when the pip is finally ground away, there shall be no center drill mark left in the end of the valve. This completes the work on the stem and radius, the next stage being the finishing off of the head.

For this purpose the special collet shown at 8 is used, having a radius on the front to suit the valve, and a specially long bore to insure the two ends of the valve being concentric. The machining of the 45 deg. valve seat and the finishing of the top diameter are accomplished by the tool 9, held in the front of the cross slide, while the radius on the top face is machined with the use of the radius tool 10, held upside down on the back slide. The final operation of centering the head calls for no special comment, and this completes the whole of the work so far as the turret lathe is concerned. As indicating the rate of production obtained, it may be added that the average actual time taken for the whole of the foregoing operations amounts to 6 min. per valve.

Portable Pneumatic Grinders

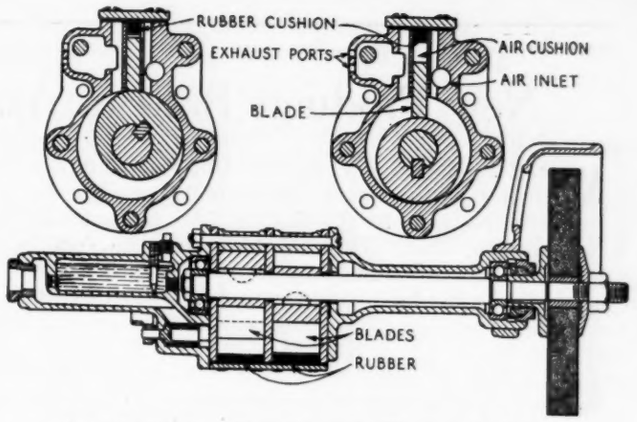


Warner & Swasey Type D-2 grinder with straight handle and Type D-2-X grinder with spade handle

THE Warner & Swazey Co., Cleveland, Ohio, announces a new line of portable pneumatic grinders. These differ from the ordinary type in that they have no pistons but instead comprise rotors located concentrically within the cylinders, together with a sliding valve. Altogether there are only three moving parts.

The drawings reproduced herewith show two sections through the cylinder with the rotor in different positions. Air enters through the air inlet, and as the latter is in communication with the air cushion chamber, the air exerts a constant pressure on the upper edge of the valve blade, insuring a proper seal between the rotor and valve blade.

The air flows into the cylinder as indicated by the arrow, causing the rotor to turn in a clockwise direction. When the rotor reaches the position shown in the view at the right, the air escapes through the exhaust port. Each machine has two rotors, which are mounted diametrically opposite each other, for balance and smooth power flow. The moving parts include the shaft assembly, comprising the shaft with the two rotors keyed upon it, and the two valve blades. While the parts of the shaft assembly are



Longitudinal section through Warner & Swasey pneumatic grinder
Cross sections through grinder motor

made of chrome nickel steel, the valve blades are made of light material (fiber).

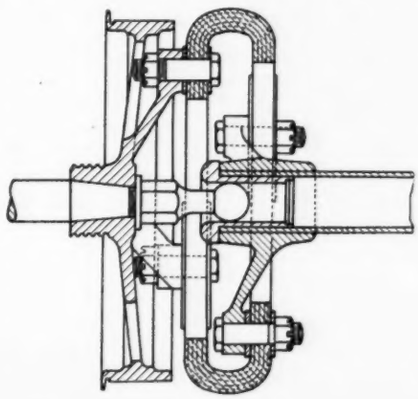
Since the rotor is mounted on ball bearings, practically the only wearing parts are the valve blades. These blades can be readily replaced with no other tools than a screw driver. A clearance of from two to three-thousandths of an inch is allowed between the rotor and cylinder wall, this space being sealed by the oil film. An oil reservoir in the air inlet holds a supply sufficient for a day's run. The rate of feed of the oil can be adjusted by a needle valve.

According to the manufacturers, the grinders will operate efficiently at air pressures of from 65 to 90 lb. per sq. in., with a consumption of from 32 to 40 cu. ft. per minute. Either a spade or straight type handle is furnished, the handle in either case being of aluminum.

This grinder is at present being made in three sizes, the Type D-2 for general grinding work, Type D-2-X for buffing and polishing and Type D-1 for automobile body buffing and light grinding work.

Superflex Shaft Coupling

A NEW type of flexible shaft coupling has been introduced in England by the Simms Motor Units Co., Gresse Street, London, W. 1. As shown in the accompanying drawing, the usual flat disk of fabric is replaced by a dual disk of U section, to which the spiders on the ends of the shaft are bolted in the ordinary way. To permit the flexible unit to be threaded over one or both spiders of the three-armed variety, the central holes are made triangular, the bolt holes with reinforcing plates passing through the fabric at the center of the sides of the triangle, as indicated by the section of the disk.



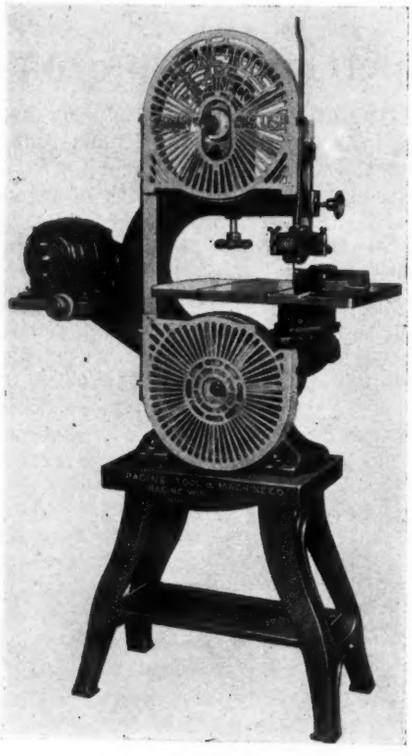
This coupling is claimed to afford a much higher degree of flexibility and to permit greater angularity of the shafts than the flat disk type, and also to provide a "shock absorber" effect, with benefit to the shaft bearings and to the gears and other transmission and drive units.

New Products Built to Assist in Automotive Production

A NEW model of the Racine Duplex band saw for cutting wood, soft metals, steel and iron is now offered to the trade by the Racine Tool & Machine Company, Racine, Wis. This machine has the feature of swiveling the table and saw guides in such a manner as to direct the blade to any desired angle, thus making possible the cutting of long stock. This is accomplished by mounting a roller guide on the table column immediately below the cutting point. The table and lower guide are integral and swivel together. An upper guide is mounted on the regular guide post and is capable of swiveling about the blade as a center. Thus the blade is supported immediately above and below the work and a straight cutting edge is always presented to the material regardless of the amount of twist given to the blade.

These swivel guides deserve particular mention. Two small, ball-bearing, hardened and ground rollers support the blade on its sides. A larger roller, also hardened and ground and ball bearing, supports the blade on the rear and takes the feeding pressure. Adjustments for alignment of the guide horizontally are provided, as well as adjustments for width and thickness of blades. Thumb screws and hand wheels are used throughout, no wrenches being required.

The new machine has the Duplex or change speed feature, thus making possible the cutting of a variety of materials and shapes at the proper speed and with the correct blade. Two distinct improvements over the straight band saw are claimed: (1) It can be used for straight cutting on ordinary work, and can also be used for cutting long stock, such as boards, pipe, bar stock, etc. (2) The blade can be guided or adjusted minutely to compensate for faulty brazing or inaccuracies in filing and setting. On ordinary machines such variations may cause the blade to crawl, and make it nearly impossible to use a fence or guide to cut multiple pieces in parallel strips. By directing the blade slightly to the right or left by the swivel guide, crawling can be overcome.

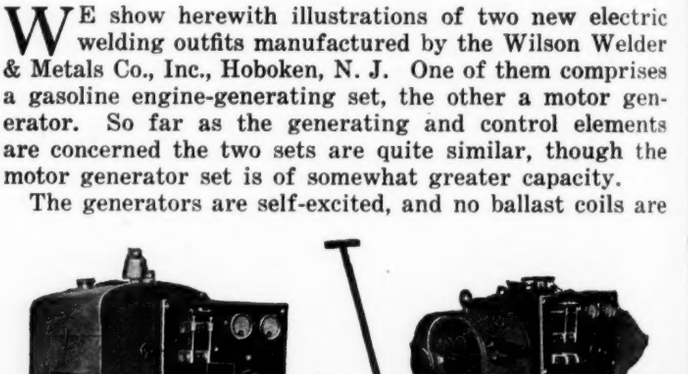


Racine duplex band saw

Two New Electric Arc-Welding Outfits

WE show herewith illustrations of two new electric welding outfits manufactured by the Wilson Welder & Metals Co., Inc., Hoboken, N. J. One of them comprises a gasoline engine-generating set, the other a motor generator. So far as the generating and control elements are concerned the two sets are quite similar, though the motor generator set is of somewhat greater capacity.

The generators are self-excited, and no ballast coils are used, hence the voltage generated is limited to that of the arc plus the drop in the welding leads. The current is regulated by means of the knob of the field rheostat. A reactance steadies the arc under all conditions. It is claimed that with both sets work can be turned out at a rapid rate, electrodes up to 3/16 in. diameter being used with the engine-driven set and up to ¼ in. diameter with the motor generator set. The full load currents of the two generators are 200 and 250 amperes respectively, and they are so designed that the current will not rise more than 10 per cent above the rated maximum, to reduce the liability of the electrode sticking to the work when the arc is struck.



Wilson plastic arc motor-driven welding machine

Wilson plastic arc engine-driven welding machine

The engine-driven set comprises a Leroi four-cylinder 3⅛ by 4½ in. engine and a ball bearing generator with an open circuit voltage of 50, a welding voltage of 25 and a current output variable between 75 and 200 amperes.

The motor generator set is furnished with a standard 10 hp. motor of any commercial voltage, phase or frequency. With alternating current motors an enclosed starter is furnished, with magnetically operated push-button, under-voltage and thermal overload protection. The starter furnished with direct current motors also is of the enclosed type and gives low voltage protection. The range of current adjustment is from 75 to 250 amperes in small steps.

French Door Lock and New Belflex Product Announced

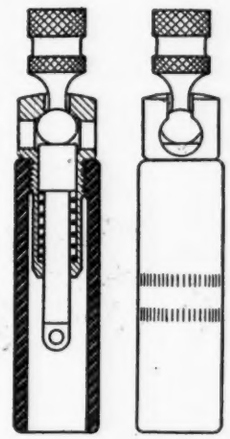
A NEW door lock for automobile bodies and a new spark plug connector have been brought to this country from France by Rene Gouiraud, who is at present in New York City. The lock is known as the Descombres lock and is widely used by French automobile manufacturers and body builders, among others by Citroen, Berliet and Peugeot.

A sketch of the lock, showing it from the rear, is presented herewith. The part shown on the left is fastened to the door frame by means of wood screws. This is a bronze forging and is provided with a hook which enters a suitably shaped recess in the lock plate. Three faces of the hook are inclined or tapered, and as the corresponding sides of the recess in the lock are similarly inclined, this has a tendency to hold the door firmly and prevent all rattle. In the sketch the point of the hook can be seen projecting through the lock plate.

A modification of the part fastening to the door frame is shown by the detail view in the upper left hand corner. With the ordinary type of hook, when the door is open there is some danger of the passengers' clothing catching in the hook when entering or alighting from the car. This is prevented in the special construction by a brass clip which is held by a light coiled spring in the position shown when the door is open, whereas when the door is closed it is pressed against the base of the hook.

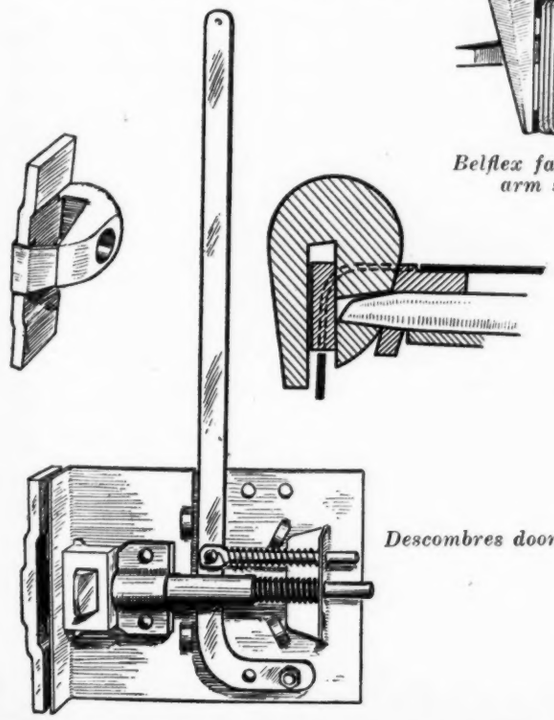
It will be seen from this detail view that the hook is provided with a tapering hole, and the actual locking action consists in the tapering end of the locking bolt entering this taper hole, under the pressure of the coiled spring surrounding the lock bolt. This is another tapering contact which further tends to eliminate the possibility of rattle in the lock.

The lock can be opened by means of the upwardly extending lever, which can be provided with a suitable ornamental handle extending up from the door. In one type made, the lock has a barrel with a square hole through it, through which may be inserted the stem of an inside or outside handle.



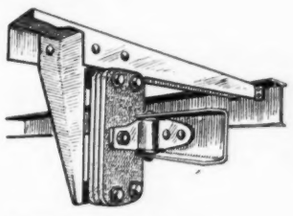
Broc spring type connector

A sectional view of the clip connector for spark plug terminals is shown herewith. The spark plug is provided with a ball-headed terminal. This ball head can be inserted into the connector through a hole at the side, and the terminal then swung around the center of the ball so that its stem passes through a slot in the side of the connector. A spring pressed plunger within the terminal presses against the ball head and holds it in position as shown. The wire or core of the high tension cable fastens to the plunger, which has a hole drilled through its end, and the insulated end of the cable is slipped into a hard rubber cuff or sleeve which screws over the metal connector. The connection between the spark plug terminal and the connector is of a universal nature and the connector does not have to stand in line with the terminal as shown in the drawing. This is known as the Broc spark plug terminal and connector.

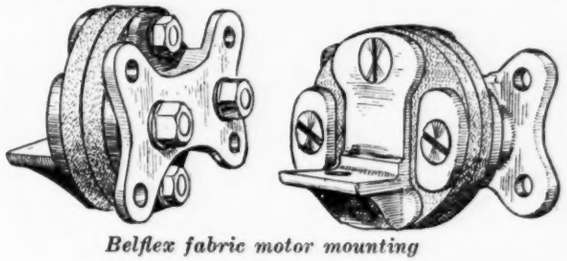


Descombres doorlock

Torque Arm Support and Motor Mounting of Rubberized Fabric



Belflex fabric torque arm support



Belflex fabric motor mounting

THE Belflex Corporation of New York City, which several years ago came on the market with a spring shackle composed of rubberized fabric, has now added to its line a torque arm support and a motor mounting of the same material. The spring shackles of the concern are used on the new Premier taxicab and the torque arm supports on Peerless, Pierce Arrow and Cunningham cars.

Torque arms ordinarily are supported at their forward end by a short metallic link containing a spring-cushioned spherical joint. As compared with this construction the Belflex fabric torque arm support has the advantages that it eliminates direct metallic contact between torque arm and frame member, renders lubrication unnecessary and prevents rattles and squeaks. It is also claimed that rear axle noises are deadened and that the support requires no attention of any kind.

The Belflex fabric motor mounting, of which two views are shown herewith, is designed to absorb the vibrations of the engine and prevent their transmission to the frame.

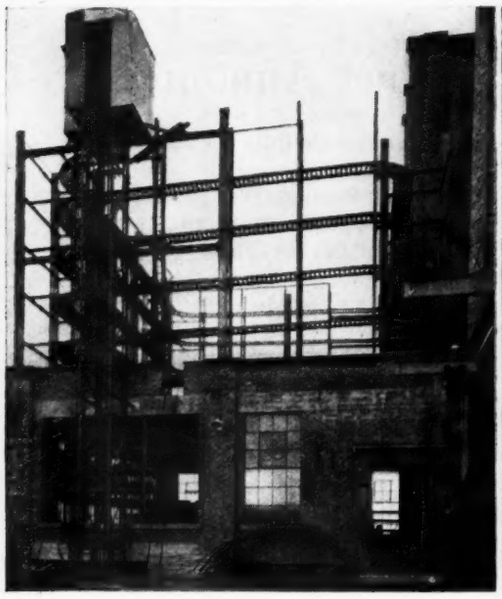


Fig. 1—Elevator and storage track for cylinder castings

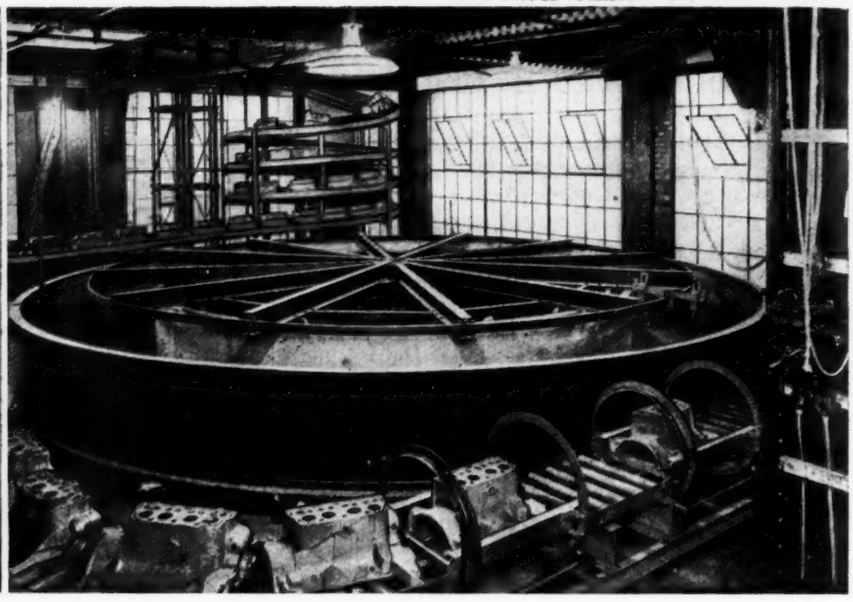


Fig. 2—The pickling bath through which the castings move continuously. Machine makes one revolution in 2½ hr.

Engine Blocks Completely Machined in One Multiple Tool Operation

Cylinder and crankcase blocks loaded into machine at one end come out 224 minutes later entirely machined with all bearings and studs in place. One block turned out every 4½ minutes.

SOME rather remarkable equipment has been evolved for the production of the Morris engine and change gear, in Coventry, England, this being the power-plant of the best selling British light car. The production methods and equipment employed were described in a paper presented to the Institution of Automobile Engineers by Frank G. Woollard, from which the following, relating to the machining of the cylinder block, is condensed:

The layout of the works is arranged around the cylinder block, which besides being the largest, heaviest and most costly component, may also be regarded as the backbone of the power unit. All other components flow to meet the cylinder block, which, theoretically, now (and actually within a short period) will not touch the floor from the time it leaves the foundry until it is a finished engine, and not even then, since the finished engines are mounted on low four-wheeled trolleys for convenient handling.

Let us, then, follow the cylinder block from the time it is delivered to the works.

It is unloaded from the tail-board of the truck by manual labor on to a grid platform, where an elevator of the tray type lifts it to a storage track, which might conveniently be described as a rectangular helix (Fig. 1). This storage has been erected above the pickling shop, and the cylinder block gravitates to the pickling tank, virtually filling up the space vacated by the finished engine that has just been despatched. The block enters the pickling shop by means of a true helical roller track of smaller diameter, and is delivered on to a straight piece of track for final fettling and examination for hardness, and thence it is delivered to the pickling bath. The pickling bath (Fig. 2) consists of a lead-lined circular tank 28 ft. outside diameter, 4 ft. 6 in. wide and 3 ft. deep, which contains a dilute mixture of sulphuric and hydrofluoric acid. The block is lifted by air hoist and taken on a runway to a position over what is commonly called the "roundabout." This is an angle-iron construction, supported in the center by a vertical revolving shaft, from which radiating arms carry a circular rail 23 ft. 6 in. diameter, from which the blocks are swung on grips made in mild steel and monel metal, two abreast. The journey from the loading to the unloading station, i.e., once around the bath, takes approximately 2¾ hours, and this gives sufficient time in which to rid the block of sand and scale. The bath is kept at a moderate temperature by heating pipes, and the fumes are taken off by a fan in the roof of the building. The whole of the pickling apparatus will, if necessary, be inclosed from floor to ceiling.

The total storage capacity held on the spiral, in the tank and on the shop tracks is 850, or, at present output, four days' supply. The advantages gained by this method of storage are as follows:

1. The provision of a buffer quantity of cylinder blocks between foundry and machine shop.
2. An extensible storage capacity.
3. A great saving of works transport.
4. The cheapest and most compact storage.
5. The saving of ground-floor space on a congested site.

6. Adequate insurance that cylinder blocks shall be used as cast.

7. The provision of better conditions for the operators.

8. Insurance that blocks shall be in the bath long enough to be freed of sand and scale.

9. Unloading takes less than one-sixth of the time occupied previous to this installation.

After pickling, the block is hosed down with cold water to wash the sand away and then is transferred by air hoist into a killing bath and deposited on one of four adjacent roller tracks, on which it dries off and is delivered to the cylinder-block machine. These tracks, which are used for sorting the types of cylinder blocks, go right across the shop and form part of the storage space.

The Cylinder Block Machine

The roller-track tiers are stepped at their termini to permit easy access to the blocks, which are lifted off by pneumatic hoist on to the setting fixture on the cylinder-block machine, a layout plan of which is shown in Fig. 3.

This machine is, in many ways, quite unique. It is 181 ft. long, 11 ft. 4 in. high and 11 ft. at its greatest width. It weighs upward of 300 tons, and will shortly be capable of finishing cylinder blocks from the casting to the finished job, including bearing blocks, crankshaft bearings and all studs, at the rate of one every four minutes, it being understood, of course, that the total time a block takes to pass all operations is 224 minutes. The total weight of metal removed is 40 lb.

There are 53 operation stages employed and 81 electric motors with a combined rating of 267 hp. It will be noted that the block is to be delivered from the machine complete with studs, bearings, etc., so that the backbone of the power unit will be ready to have all the "loose" parts attached to make it a complete engine, hand-fitting only being required on the assembly line.

To call this piece of plant a machine is, of course, a misnomer; it is an aggregation of simple machines attached to a continuous bed, which bed carries all the services, such as electric power and light, compressed air, also studs when necessary, and a conveyor for chips. It has a continuous table which carries the fixtures and jigs, and it will have one common control-shaft to time the motion of all the heads. The size of this cylinder-block machine is such that it is impossible to get even a panoramic view of it.

The best means of describing the "machine" will be to run through the major movements—the details being omitted lest the paper should read like a shop operation sheet.

The cylinder is loaded from the track into the setting jig, Fig. 4, and operation No. 1 consists in bringing the block in the jig under the settling fixture. Here the block is inspected through sighting holes, and set to gages, three movements serving to clamp the block firmly in the jig. A pedal provides the lifting movement to the roller track, enabling the loaded jig to be brought under the fixture. When the roller track drops the fixture sets on the solid bed. A lever locates the jig endwise; the jig carries a segment which locates the flywheel housing, and other stops are provided. After this setting, which is also the second stage in the rough-material inspection, the block in the jig travels round on the roller track to the second-operation head, which mills the bosses on the engine arms and two "spotting" pads on the top of the block. Operation No. 3 provides for the drilling and reaming of the arm holes, and from these points all subsequent operations are located. In operation No. 4 the block, having been lifted from the setting jig by pneumatic hoist, is placed into one of a series of box jigs, on a rotary milling table, where two roughing heads and two finishing heads produce the joint face between the block and the sump, which face is also the bearing-block seating (the bearing blocks in this engine are not integral with the casting). Operation No. 5, for which the block sets on the previously milled face, held by clamps on the cylinder arms, consists in milling the top face for the cylinder-head joint. These milling tables are shown with their heads in Fig. 6.

Face Milling Operations

The tables are 10 ft. in diameter and revolve once every 112 minutes. Both roughing and finishing cutters for the sump face are 16 in. diameter, the single finishing cutter for the head is 19 in. diameter, the average depth of cut is 4.5 mm. roughing and 0.75 mm. finishing. The milling cutters are always working on two blocks. Subsequent to this operation are sundry minor ones until rough boring is reached at operation No. 10. The path of the block through this portion of the machine is interesting. The time cycle for the machine, as before remarked, is four minutes. The setting operation is a four-minute operation; the subsequent operations, up to and including rough boring, take eight minutes; after rough boring the four-minute time cycle obtains until the end of the series with two exceptions.

The matching in of the time cycle in the earlier opera-

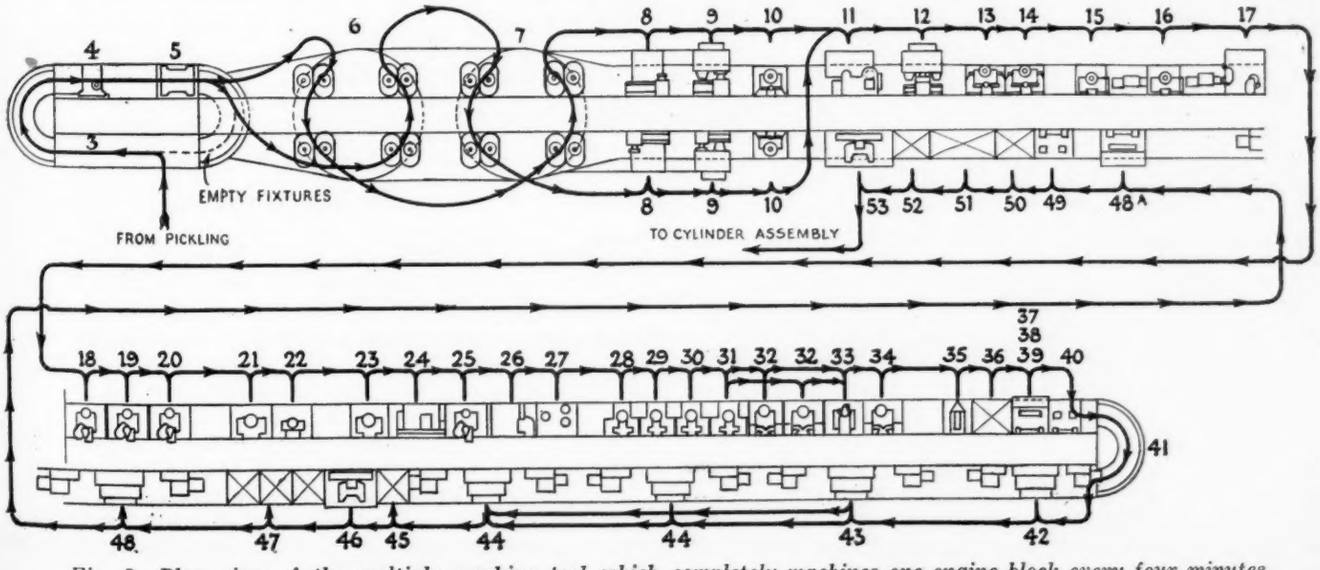


Fig. 3—Plan view of the multiple machine tool which completely machines one engine block every four minutes

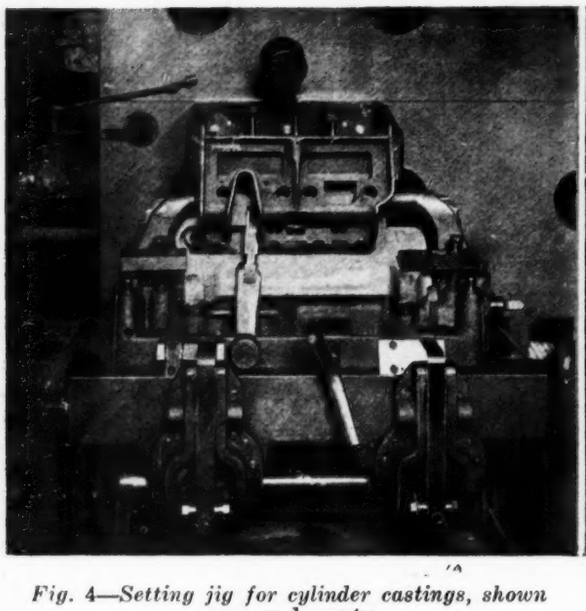


Fig. 4—Setting jig for cylinder castings, shown open and empty

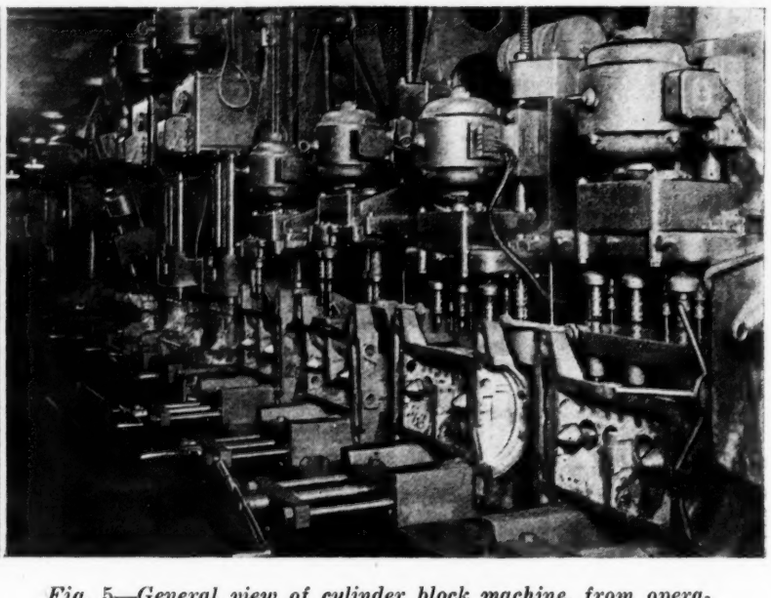


Fig. 5—General view of cylinder block machine, from operation No. 28 to operation No. 40

tions was complicated by the fact that on the continuous milling operations the block passes from one side of the machine to the other. The arrows on the diagram of the new machine layout shown in Fig. 3 indicate how this problem was solved. The work-piece from now on slides from jig to jig, the overhead lifting tackle only being used for bridging an operation where two machines are needed to bring an eight-minute time factor to four minutes, such as at final boring, or where a box jig is used, such as in the sump-face milling operation. The sliding is made possible by the introduction of "making-up" plates, which are fitted to the bed of the machine between the jigs, thus making a continuous skid way.

Light Operations Follow Cylinder Boring

There is nothing remarkable in the rough boring, but this completes the series of heavy operations, i.e., where large amounts of metal are removed. Then, before reaching the finished boring, there follow a considerable number of light operations. This is necessary to give the block time to cool down—the cut and feeds up to and including rough boring being sufficient to raise the temperature quite appreciably. Operation No. 11 is interesting in the fact that four faces are milled at the same time, two in the horizontal and two in the vertical plane, all at different distances from the datum lines, four separate cutters, each on its individual spindle, being used.

Another interesting operation is that of drilling and tapping the block for the head studs, magneto platform and accelerator-pedal seat as a vertical operation, and of the inlet-water-joint face and camshaft-cover face as a horizontal operation requiring twenty-three spindles, four of which are horizontal.

The details given in Table II are worth noting, because, in spite of the different diameters and pitches, the accuracy attained is such that the threads have been picked up six times in succession on the same block, leaving the holes still within the gage limits, and this can be repeated at any time. The drilling and tapping have to be controlled within a depth of 1-5 mm. to prevent the possibility of breaking through into the water jacket. The drilling head is in general the same as the tapping head and so would reverse the spindle motion for withdrawal, but, as this would rub the lands of the drills away quickly, the drills are mechanically prevented from revolving on withdrawal.

The bottom or sump face of the block also has twenty-three vertically-tapped holes, with two different diameters and pitches, and is equally satisfactory.

The finish-boring operation takes eight minutes, so two machine heads are provided, and the blocks each miss one head alternately, and to enable this to be done the overhead runway is requisitioned, the path being shown in Fig. 3, operation 32.

After finish-boring or reaming, the bores are glazed or burnished by a rolling tool, the four being done at one operation instead of separately, as formerly was the case. This burnishing puts a very fine gloss on the bore, such as would take approximately 5,000 miles of actual car running to obtain. The reaming finish is, of course, very smooth and extremely accurate.

The water test comes after burnishing, a quick-clamping jig being used, which seals all outlets; the pressure is applied through a siphon tank with compressed air.

Then the block rounds the end of the machine column

TABLE II.

Head studs, vertical short reach.....	15 holes	12 mm. dia.	1-5 mm. pitch
Magneto and accelerator - platform studs, vertical long reach.....	4 holes	10 mm. dia.	1-5 mm. pitch
Water - joint studs, horizontal	2 holes	10 mm. dia.	1-5 mm. pitch
Camshaft - cover, studs, horizontal.	2 holes	8 mm. dia.	1-0 mm. pitch

on a roller track, heading in the direction from which it started. While on the roller track, the bearing blocks are fitted ready for the next series of operations, namely:

A. Core drill the bores for the camshaft and magneto shaft—Trepan the magneto boss and rough face;
B. Rough bore the face for the camshaft and magneto shaft—Finish back face of magneto boss;
C. Finish bore for the camshaft and crankshaft—Finish the bore for the magneto shaft and finish facing the front boss;

which are all performed by the same types of machine heads, the block being held by a similar pattern of jig. Four heads are used on each operation. Each head is driven by a separate motor, and the same feed-box is used in each case, a dummy spindle being inserted where the drive is not required. All the motors are electrically interlocked, so that, in the event of a failure of motor or feed mechanism, the whole group ceases to act. This electrical interlocking is carried out in all cases where damage would be done to the machine or the work by one piece of mechanism "carrying on" while the others had ceased to work.

Open Jig Used

An open jig is used in this operation, with a hinged bush-plate, balanced so that one man can easily raise the heavy plate. The block is pushed in and positioned by means of plugs in the front and rear cylinder bores, and definitely located by the usual dowels in the reamed holes in the arms. Clamping is performed by the handle in front, which operates draw-bolts protruding through the cylinder plugs. The accuracy of the work is determined by very long guide bushes and the fact that the hinged member has two right-angle fitting plates of hardened steel which land on to a rectangular abutment and are locked in that position as the jig closes.

After this series of operations, the block is put into a revolving soda bath, the tank being mounted on the main column of the machine, the knee of which is broken for the purpose of accommodating this apparatus.

The next operation finds the knee of the machine being used as a fitting bench, for it is here that the bronze-backed white-metalled crankshaft bearings are fitted to the bearing blocks. The following operation is that of reaming the bearings, using similar heads and jigs to those just described.

After this, the studs are fitted by a single head of drill pattern, mounted on two slides at right angles, which covers the block quite easily. A multi-head is not used at this point, as the time factor is sufficient to allow of the accomplishment of the job, and in no case has a complicated head been used when one of a simple type suffices.

The final operation is the kerosene wash to rid the block of all borings and chips not removed by the previous washing operation. After this, the block goes to the inspection line.

Inspection between operations is of little or no value, and so is being abolished—the machine is timed for a cylinder block every four minutes of its running time, and it is, except for the slight extra power consumed and the tool wastage, as cheap to run the whole machine as to miss certain operations, while the value of the group inspection at the end of the line is very great. It lies chiefly in the fact that there is no stoppage or piling up of the work; the machine relentlessly pushes the work on, and, if there is trouble, it is what the author calls "organized trouble," which is highly visible to the management. Naturally, the foreman of the machine has to keep a watchful eye on the work and to see that the operators' gages are in reasonable use.

At this line, which is a roller track, the valves will meet the cylinder block. They are here ground in and held in position until the springs and clip washers are fitted (which is one of the last assembly operations), by an aluminum frame retainer. This line eventually meets the assembly track, which is comprised of an oval angle-iron floor track with an elevated roller conveyor forming its major axis.

For assembly, the block first travels down the elevated track, where it collects certain minor components, which can only conveniently be fitted at breast height. At the end of this track longitudinal bearers to make a temporary sub-frame are fitted to the arms of the block. The block is then lifted on to a wheeled stand with "W" shaped ends; the bearers rest in one "V" of the "W" for part of the assembly, and are rolled over on to the other "V" for the remainder, thus enabling the men to work on both top and bottom of the block. As the stand passes certain stations, the components and sub-assemblies are added to the block from trucks or trays which stand adjacent to the track and which carry a daily issue of parts. Deliveries will eventually be made by conveyor.

The engine is rolled over after the sump is fitted, and the valve setting and tappet adjustment is presented at a convenient height. Head nuts and others are driven home by compressed air.

In spite of close limits, it is found that cumulative errors creep in when the tolerances all operate in the same direction. Therefore, certain selective assembly is considered desirable to get the very best results. This is particularly the case with the timing-gear assembly, where there are so many matching parts. Owing to the very close clearances to which they are fitted, selective assembly is also desirable for aluminum pistons. The total variation in weight allowable between the heaviest and lightest piston and connecting-rod assembly is four drams, so that selective assembly becomes necessary in this case. Valves are, of course, kept to their proper seats, and camshafts are adjusted for clearance. A history card, giving these and certain test particulars, is sent to the Morris assembly plant for future reference.

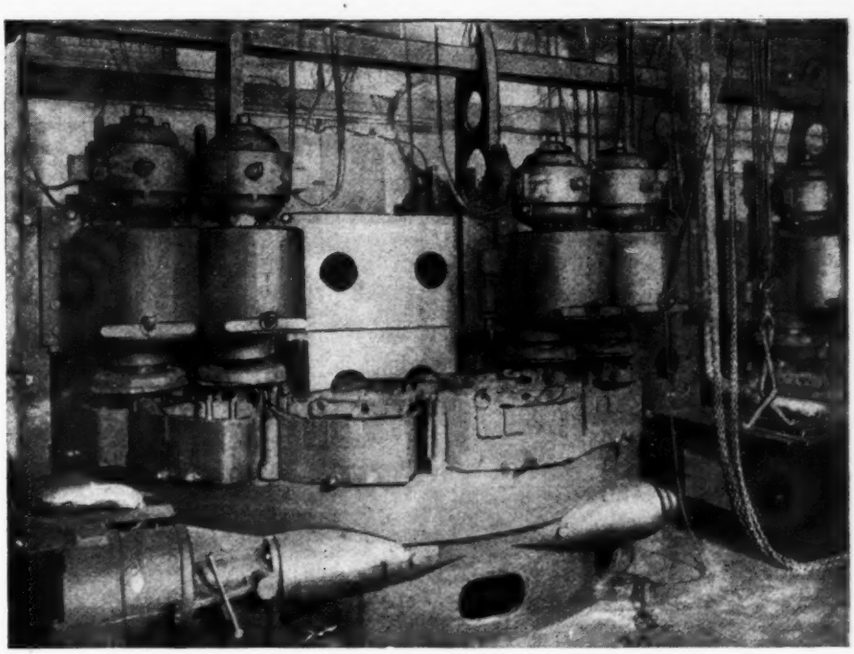


Fig. 6—Side view of one of the circular milling tables which are charged and emptied on opposite sides

The finished engine is lifted by an overhead air hoist and loaded on to one of the four-wheeled steel trolleys which fill a rectangular track around the test bed.

While on this trolley the engine receives its oil charge, and is pushed to the place where the gear-box and clutch assembly meet and are bolted up to the engine.

British Experiments Indicate That Piston Ring Lubrication Is of Boundary Type

This assumes an oil film of such minute depth that there is practically a single layer of molecules in it. Frictional losses then vary in accordance with laws of solid friction.

SOME further researches on the nature of lubrication have been carried out for the Lubrication Research Committee of the Department of Scientific and Industrial Research (Great Britain) at the National Physical Laboratory by Dr. T. E. Stanton. In earlier researches it was shown that if a cylindrical bearing under comparatively heavy load is subjected to a slow rocking motion, the surfaces in general are not separated by a continuous film of lubricant and the conditions of lubrication are those to which the term boundary lubrication has been applied; that is, the distance between surfaces is of molecular dimensions. It was found that under these conditions a considerable reduction in the coefficient of friction could be effected by adding small quantities of fatty acids to the mineral oil used as lubricant. In the later experiments the frictional surfaces were those of the cylinders of an internal combustion engine. A brief report on these experiments was published in *The Engineer* of London, from which the following is abstracted.

The apparatus consists of a heavy pendulum mounted on ball bearings and swinging under gravity through a small arc. Two engine cylinders are coupled together coaxially by bolts passing through end covers and having a common head R recessed to take the cylinder ends and forming with them a gas-tight space between the two pistons, which are also rigidly coupled together. The combined cylinders are mounted on a bed plate carried by the stanchions of the building, with their axis horizontal and in the plane of swing of the pendulum. The coupled pistons are connected by a rocking link to the shank of the pendulum as shown.

Connection from an air drum, in which an air pressure up to 80 lb. per sq. in. could be maintained, was made to the head R, so that the same pressure as in the drum was effective between the pistons. An electrical heating element was placed inside the head and the walls of the cylinder were fitted with a thermo-couple, so that they could be maintained at any desired temperature. Small holes were drilled through the piston wall at the bottom of the ring grooves, from which a connection was made by strong rubber tube to a Bourdon gage, which made it possible to determine the gaseous pressure forcing the rings against the cylinder wall.

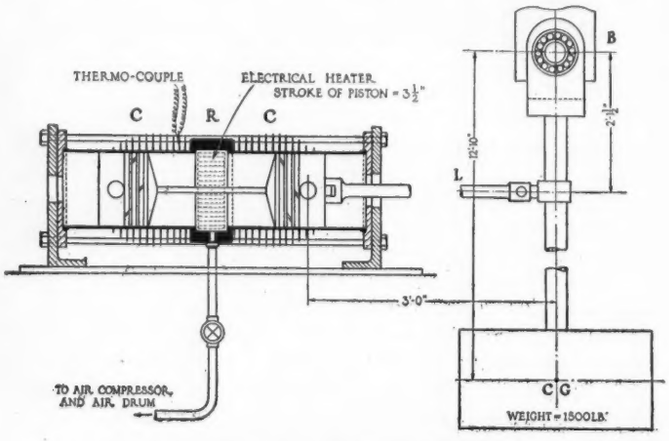


Fig. 1—Diagram of experimental apparatus used by Dr. Stanton

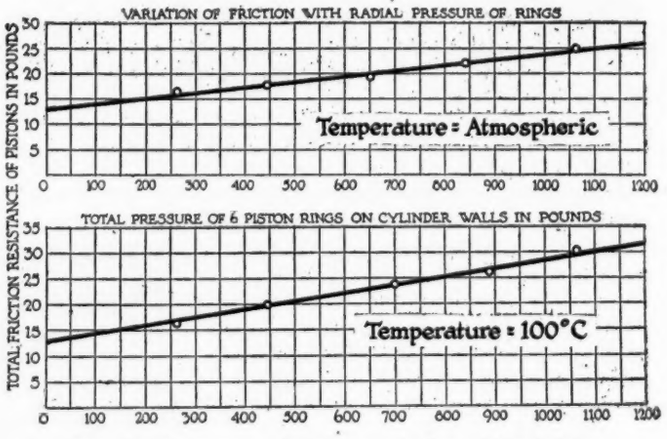

VARIATION OF FRICTION WITH RADIAL PRESSURE OF RINGS
TOTAL FRICTION RESISTANCE OF PISTONS IN POUNDS
Temperature = Atmospheric
TOTAL PRESSURE OF 6 PISTON RINGS ON CYLINDER WALLS IN POUNDS
Temperature = 100°C

Fig. 2—Diagrams showing variation of total friction with outward pressure on rings

Any motion of the pendulum will be damped by the friction of the ball bearing and the air friction, but these are negligible as compared with the friction of the piston and rings against the cylinder walls. Therefore, the damping factor may be regarded as a direct measure of the piston and ring friction.

A first series of tests was made to determine the friction of the piston and rings when lubricated with castor oil and maintained at atmospheric temperature, the pressure in the cylinders being varied betwen 0 and 80 lb. per sq. in. In a second series all conditions were the same as in the first, except that the temperature of the cylinder walls was maintained at 100 deg. C. The rates of damping in both series of tests were found to be absolutely uniform. This permits the friction to be calculated from the rate of damping by means of the expression $4\ Fr/WL$ = rate of damping in radians per complete oscillation, where W is the weight of the pendulum, L its radius and r the distance from the axis of the point of application of the friction F. The results of both series of tests are given in Table I, in which are also tabulated the observed pressures at the back of the piston rings.

In will be noted that the pressure under the top ring is practically equal to that in the cylinder in all cases, and the pressure under the second ring shows a slight falling off, and while comparatively little pressure gets to the third ring groove. (In this connection it should be pointed out, however, that the pressure and speed conditions are en-

tirely different here from those obtaining in an automotive engine. The pressure here acts on the pistons continuously, instead of only for an instant, and the pistons make a stroke in two seconds as compared with, say, one hundredth of a second. It seems likely that in an actual engine some gaseous pressure will build up under the piston rings, chiefly the top one, probably of the order of the mean pressure in the cylinder during the cycle. Under full load conditions this would not be more than 25 lb.

TABLE 1

Pressure (Gauge), Lb./In.²	Rate of Damping (Radians per Oscillation) Temp.		Friction in Lb. Temp.		Pressure Behind Piston Rings Lb./Sq. In. at All Temperatures)		
	Atmos.	100° C.	Atmos.	100° C.	No. 1	No. 2	No. 3
0	0.0074	0.0071	16.8	10.0	0	0	0
20	0.0079	0.0088	18.0	20.0	18	16	2
40	0.0087	0.0102	19.6	22.8	39	36	5
60	0.0098	0.0114	22.0	25.6	60	56	8
80	0.0110	0.0132	24.8	30.0	79	75	18

per sq. in., and under normal load in an automobile engine a great deal less.—Editor).

Dr. Santon says it is noteworthy that the frictional resistance at atmospheric pressure is still considerable, and of the order of 16 lb. This is due partly to the pressure on the cylinder wall exerted by the elastic spring of the ring and partly to the friction of the piston itself. By a formula due to Professor Perry it is calculated, from the force required to close the gap, that the pressure of the ring was 19.1 lb. per sq. in., and the total pressure for the six rings 262 lb., which, of course, adds to the observed gaseous pressure behind the ring.

The variation of friction with radial pressure is shown in Fig. 2. It will be seen that what may be called the residual friction, due to the pistons alone, is still considerable, and is more than would be expected from the fact that the side thrust of the pistons on the cylinder walls due to the obliquity of the connecting rods was in this case negligible, and, further, the piston clearance was large—0.027 in. However, in the case of experiments on the friction of pistons alone the existence of an oil film was indicated and the residual friction appears to be due to this film.

The coefficient of friction for the rings is approximately 0.028 for the high temperature and 0.023 for the atmospheric temperature, which are said to be remarkably low values for the case of boundary lubrication. From the experiments described the following conclusions are drawn by Dr. Stanton:

"It appears that the lubrication of piston rings is of the boundary type, and that their frictional resistance will depend on the normal pressure between the rings and the cylinder wall. It is clear, therefore, that any device which will prevent the leakage of the gas or steam from the back of the piston to the space behind the piston rings will improve the mechanical efficiency of the engine. As regards the piston, it may be assumed that in all cases in which there is an appreciable side thrust due to the obliquity of the connecting-rod, the frictional resistance of the piston will also be proportional to the load.

"In the experiments here described it may be remarked that the friction of the rings is only a small fraction of the total pressure on the piston; thus, at a pressure of 80 lb. per sq. in., the ring friction of a single piston was of the order of 9 lb., which is only 1 per cent of the total pressure on the piston. Assuming the same value of the coefficient of friction for the piston as for the rings, it would appear that in ordinary internal combustion engine practice if the lubrication were as efficient as in the experiments, the maximum friction of the piston and rings would be of the order of 3 per cent of the mean pressure on the piston. This is thought to be lower than the value commonly assumed for piston and ring friction, and is probably due to the relatively greater efficiency of the lubrication in the experiments compared with that which exists in practice."

Electric Heat in Storage Battery Manufacture

ELECTRIC heat has found extensive application in the factories of the Westinghouse Storage Battery Co. at Swissvale, Pa. The apparatus used is standard material but the applications are unique in some cases.

Heating the sealing compound used for sealing the covers into the cells of automotive batteries has always been a problem. For the best working of this compound, its temperature must be held fairly constant, within 8 or 10 deg. F. Its heat conductivity is so low that a hot plate under the kettle is extremely inefficient and slow, and it is so inflammable that any kind of open flame is dangerous.

This problem was solved with the aid of electric heat. Westinghouse space heaters were clamped solidly against the sides and bottom of the compound tanks, and the tanks and heaters were then covered with sheet asbestos. The pipe which leads from the tank to the nozzle of the sealing machines is heated by passing a current, of low voltage and high amperage, through it. Near the nozzle of this pipe is inserted a thermo-couple that actuates a relay. This, in turn, opens and closes the circuit leading to both the space feeders and the feed pipe, and keeps the temperature within the desired limits.

The manufacture of the soft metal storage battery grids introduced an awkward heating problem. The grids have a very light cross section, and are cast in metal molds.

Unless the molds are at exactly the right temperature, it is impossible to get good production of perfect grids. Heretofore an open flame has generally been used to heat these metal molds. However, it is difficult to get the correct temperature with the open flame. Furthermore, the open flame is dangerous.

Electric heaters were found to give the right sort of heating conditions. Three heaters are clamped on each side of the mold. They are connected in opposite pairs, so that the operator can control the temperature of any part of the mold by means of a switch. No attempt is made to do this automatically, because molds for different grids require different heats. Pilot lights indicate to the operator which pair or pairs of heaters are working at any time.

Electrically heated lead pots also are used for melting small quantities of lead, solder, etc., in other departments.

In one department long strings or "worms" of sealing compound about one-fourth of an inch square are used. They are used cold and extruded from a press. It was found that the press could not handle the cold compound very well, so a couple of space heaters were clamped on the outside. They warm the press just enough so that the compound flows out of the press in just the proper oition to use.

Unsprung Weight in Cadillac Chassis Reduced

Pedal pressure required to operate four-wheel brakes also decreased. Total chassis weight reduced materially. Changes made in method of mounting the drag link and tie-rod arms.

REFINEMENTS made recently in the Cadillac chassis have reduced the unsprung weight and decreased the pedal pressures required to operate the four-wheel brakes. As a result of these changes in design, the 138-in. wheelbase chassis, on which all of the custom-built bodies with the exception of the two-passenger coupe are mounted, is said to weigh no more than did the 132-in. wheelbase V-63 chassis when it was brought out 18 months ago. The changes, of course, have been incorporated in the shorter wheelbase chassis, so it also is lighter in proportion.

Reductions in brake pedal pressures have been effected by simplifying the layout of the operating linkages. As in the past, greater leverage is obtained during the first part of the pedal travel by means of a double link. This link now connects to a substantially vertical lever which divides the braking force between the front and rear wheels. The upper end of this lever is connected by a rod to the rear wheel brake equalizer bar and the lower end is pivoted to a short arm on the cross shaft through which the forces are transmitted to the front brakes.

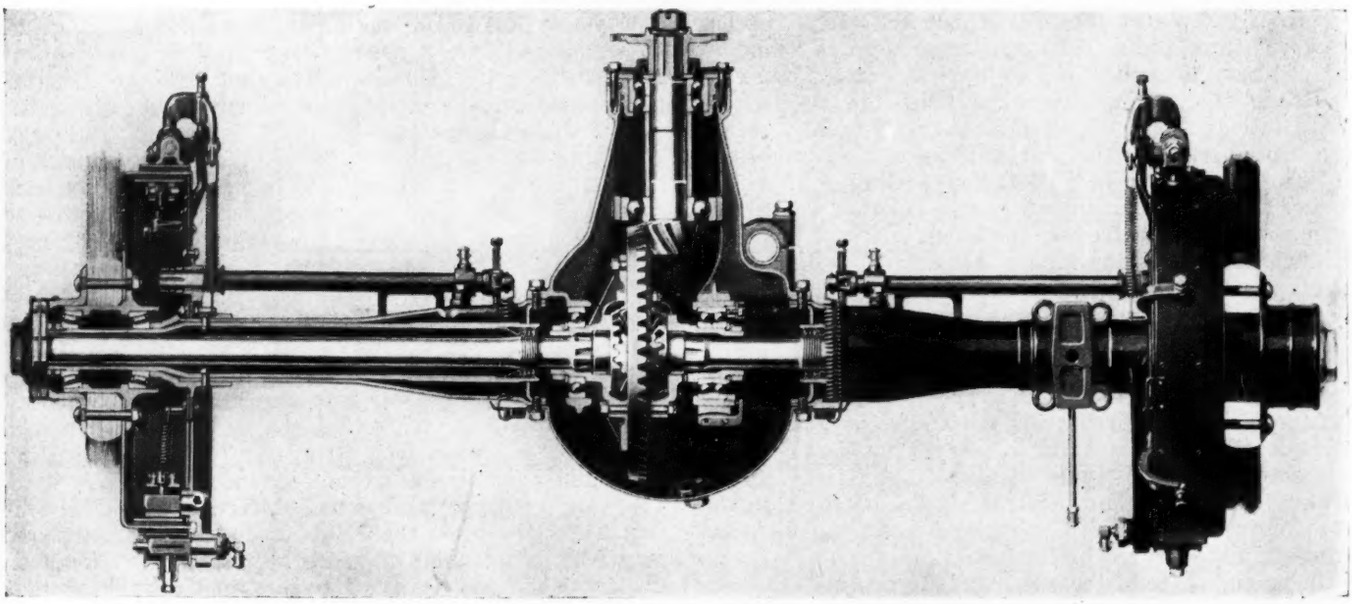
The cross shaft is supported by brackets from the heavy channel section cross member located approximately under the driver's seat. In the new design this member has been moved forward a short distance, and as a result the torque arm support has been removed from its front to its rear side.

The rear-wheel brake equalizer now is located directly under the cross member at the rear spring brackets. Its ends are connected to levers on the inner ends of cross shafts supported from this member. These shafts pass through the frame and spring brackets and, on their outer ends, have levers which are linked to the rear wheel brake operating levers by rods. This change in layout eliminates the brake rocker shafts for the external brakes from the rear axle.

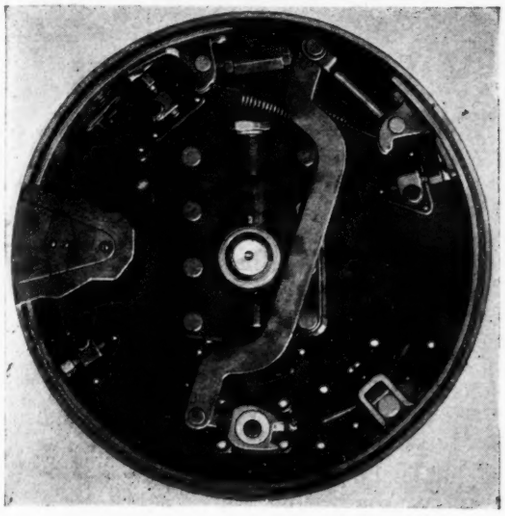
Some unsprung weight has been eliminated by swinging the entire internal rear wheel brake about 30 deg. clockwise, so that its anchor now is on the same radius as the external brake anchor. Consequently, only one supporting bracket is required for the two anchors, instead of two, as in the old construction.

The clearance adjustment on both the front and rear internal brakes has been modified. It now consists of a turnbuckle with locking nuts in one of the toggle links. The hand brake operating linkages are substantially the same as in the past, except that the cross shaft now is mounted on the rear of the cross member at the rear spring brackets, instead of on the front.

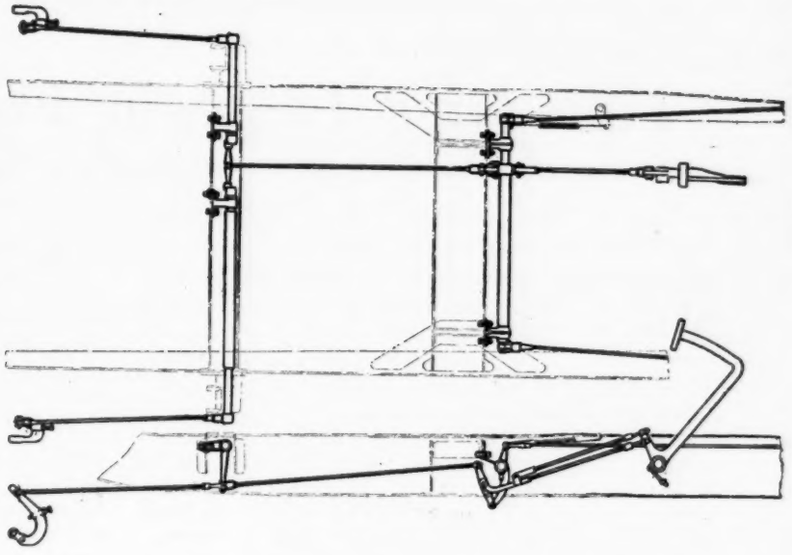
Rear axle weight has been reduced by improvements in its design which give it equal strength with less metal. New Departure ball bearings have replaced the tapered roller bearings used formerly on the pinion shaft and differential. The pinion shaft is carried in a double row



Sectional view of new Cadillac rear axle showing ball-bearing mounting of pinion shaft and differential



Front wheel brake, showing new turnbuckle adjustment, new operating link and oblong brake supporting flange



Layout of four-wheel brake operating linkages on Cadillac

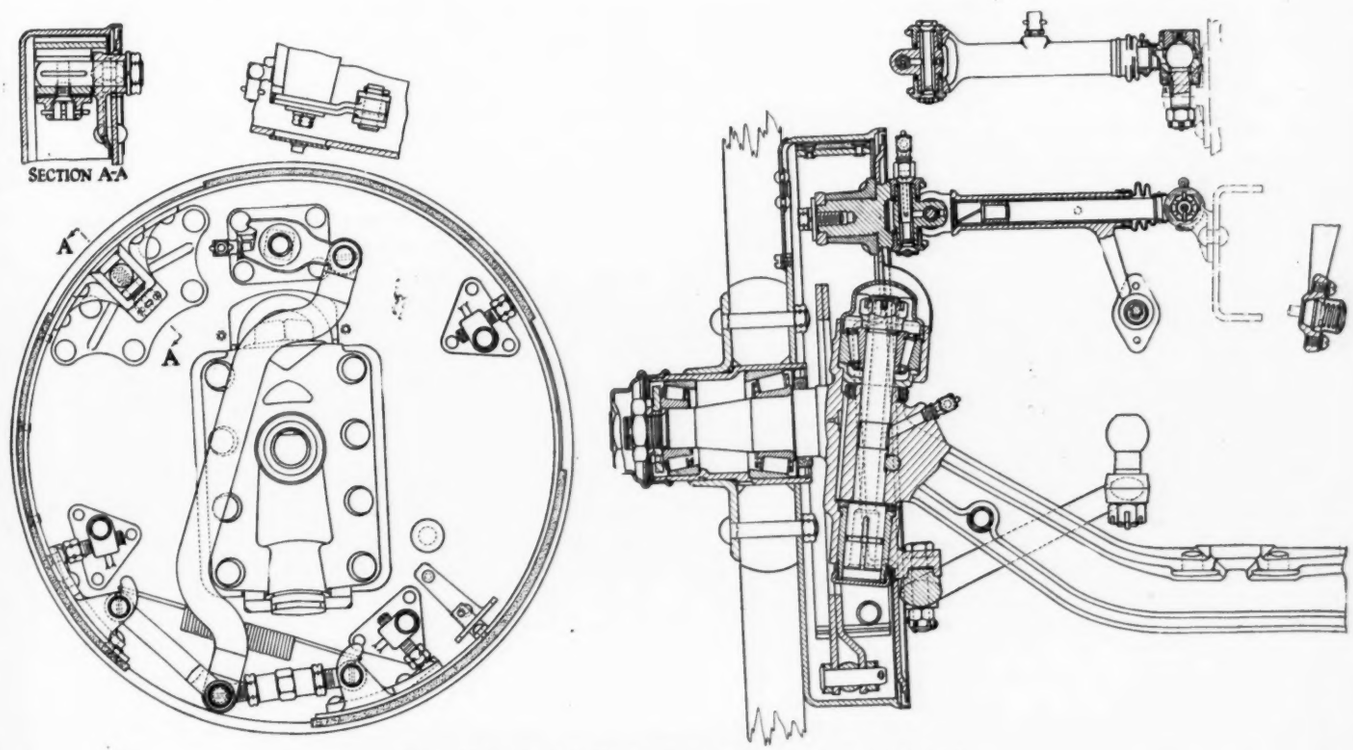
ball bearing at its forward end and in a single row annular bearing at its rear end. Fore and aft adjustment of this shaft is effected by means of shims between the differential carrier and the end plate.

The differential is supported in a double row ball bearing on the right and a single row annular bearing on the left. The former bearing is mounted in a sleeve which is threaded into the carrier and which may be screwed in or out to obtain lateral adjustment of the differential.

To prevent leakage of lubricant from the differential housing into the axle tubes, and thence out to the wheels, a novel form of sealing device has been developed, the construction of which is illustrated in the accompanying sketch. The same type of seal is also used on the pinion shaft.

Changes in the method of mounting the drag link and tie-rod arms have permitted a reduction in the weight of the steering knuckle. Formerly these arms were secured in tapered sockets in the brake supporting flange. In the new design they are forged in one piece and bolted to the bottom of a bracket forged integral with the lower end of the knuckle. To strengthen the joint at this point the top of the arm forging has a taper tongue which fits into a groove milled in the bottom of the bracket on the knuckle.

These changes made it possible to reduce the size of the brake supporting flange, which now is oblong instead of round. Some of the curvature also has been taken out of the diagonal link connecting the brake shaft with the toggle mechanism, as may be seen from the photographic view on this page.



Assembly and detail views of Cadillac front axle end

Here and There in Foreign Markets

By special arrangement with the Automotive Division, Bureau of Foreign and Domestic Commerce

Pay Taxes on Austrian Business

AMERICAN automotive manufacturers and others having branches and direct selling agencies in Austria, are being sent formulas by the Commercial Law section of the U. S. Department of Commerce for the payment of their 1925 Austrian income tax. The tax unit is fixed at 1,200,000 Austrian crowns and all incomes up to 10 units ($170) are exempt. The tax scale on incomes of $170.01 to $428.50, inclusive, is 1.1 per cent of the income; on $428.51 to $737, inclusive, 2.2 per cent; on $737.01 to $1,028.50, inclusive, 3.3 per cent; on $1,028.51 to $1,457, inclusive, 4 per cent, and on $1,457.01 to $2,057, inclusive, 4.4 per cent. The tax for incomes of over 144,000,000 crowns or $2,057, ranges from 6 per cent of the total income minus $32.90 on incomes of $2,057 to $2,742.85 to a tax of 48 per cent minus $6,027.77 on incomes of $34,285.70 and over.

Bus Use Growing in England

THERE has recently been widespread discussion regarding the relative desirability of motor buses to street cars in Leeds, England. The growing competition of the motor bus is being viewed with alarm by the street car system and efforts are being made to prevent motor buses from competing with the trolley cars and to extend the tracks of the latter. Although the present motor bus services have not been organized either by the city or by private parties to compete with the street cars actually within the city, motor bus lines, nevertheless, radiate in all directions serving the various districts beyond the city limits as well as neighboring towns within a radius of from 10 to 25 miles. This service also tends to compete with certain railroads, and in one case active steps were taken to compel the removal of the bus terminus from the immediate vicinity of the railway station in a neighboring city. Although the street railway company is opposing any legislation that might favor motor buses, strong protest is being raised by the public at large, who are opposed to the further extension of electric street-car tracks in and around Leeds and favor motor buses. In the next two years there will probably be a very large increase in bus transportation in this district and American bus manufacturers having branches in England should be governed accordingly.

Imports to the Netherlands

IMPORTS of automobiles into the Netherlands during the first ten months of 1924 numbered 6947, valued at 16,507,000 florins, an increase of over 42 per cent as compared with the corresponding period of 1923, Vice Consul Albert M. Doyle at Amsterdam cables the Automotive Division of the Department of Commerce. Imports of automobile chassis increased from 312, with a value of 794,000 florins, during the ten months period of 1923, to 495, valued at 1,152,000 florins, during the like period of 1924.

Jamaica as a Market

THE use of automobiles is comparatively new in this country. Increasing numbers of cars and trucks are being imported, as evidenced by the fact that imports of carriages and parts, including motor vehicles, amounted to approximately £80,000 value more in 1924 than in the preceding year. The main problem before the people now is that of road reconstruction.

While part of the public insist that it is impossible for Jamaica to spend large sums of money each year for the benefit of a few hundred motor vehicles, the government receives a fair amount of revenue from motor cars, which amount is expected to increase in the future, and it is not expected that it would view with favor the reduction of this particular class of imports. Since the cost of maintaining the roads is increasing steadily, owing to motor car traffic, it is certain that this problem will have to be considered at an early date.

U. S. Exports to Canada

REGISTRATIONS of passenger cars in Canada up to Nov. 1 showed an increase of 42,404 cars, about 20 per cent of which were imported from the United States, Trade Commissioner Meekins at Ottawa advises the Automotive Division. He says the prospect for 1925 is for a moderate gain in sales and it is believed that approximately 10,000 American cars will be brought in. Registrations of commercial cars increased 5717, about 17 per cent of which were imported from the United States.

Estimated purchases of American trucks and buses during the year 1925 should be between 1000 and 1500, and imports of accessories and parts, the dispatch concludes, from the United States should be at least $16,000,000.

Increased Duty Postponed

THE increase of the Australian duty on airplanes and other aircraft from 10 to 35 per cent ad valorem, previously deferred to Jan. 1, 1925, has been further postponed until July 1, 1925, according to advices from Australia received by the official representative of the Australian department of trade and customs at New York.

EDITORIAL

"Reasonable" Stocks

DEALER inventories today are proving the truth of the ancient law of physics that every action has an equal and opposite reaction. The retailers were forced to take more cars than they could handle last winter. Overstocks got them into trouble. They howled. The echo of their shouts still is ringing in the ears of factory executives.

Consequently the factories in general are going very easy right now, so far as shipping cars to retailers is concerned. They aren't doing anything that by any stretch of imagination could be called "forcing." The attitude of the factories is an equal and opposite reaction to the action of pushing the retailers too hard a year ago.

The dealers, on their side, aren't taking any chances. They know that theoretically they ought to stock a reasonable number of cars, so as to be ready for the spring business which nearly everybody agrees is going to materialize in a few months. But recent experiences have warped the definition of "reasonable" in the minds of some retailers to such an extent that it scarcely can be recognized as the same one that has been used in other normal years.

In a few cases distributors are worrying a bit about the possibility of being caught between factories and dealers and having to bear a greater share of the inventory burden than usual.

But the whole situation is far sounder and more favorable than at any time in many months. It is possible that car makers will be called on to speed up production suddenly, but as one executive said last week, "That's always a lot easier and more pleasant than to have to cut it suddenly." Everybody seems to be playing safe—which, in the long run, is a good sign.

Engines for Railcars

FOR large powers the Diesel engine now has reached a state of perfection equal to that of the Otto type automotive engine, and it seems to be forcing its way gradually into the fields of smaller units and larger production. Transportation equipment using internal combustion engines now ranges from the scooter or motorcycle at one extreme to the motor ship at the other. All motor ships, of course, are equipped with Diesel engines. The internal combustion locomotive is as yet only in the experimental stage, but what experimentation is being done is with Diesel type engines. In the submarine field the Diesel also is supreme. When we come to the railcar we reach the turning point. Some of the larger of these cars are equipped with Diesel engines, but it seems that electric transmission is required with them, and the combination of Diesel engine and electric transmission is handicapped by its great weight.

It is fairly evident that it is in the field of the railcar that real competition between Diesel and Otto type engines will arise first. The power units required are of considerable size, and thus the saving that may be effected through the use of much cheaper fuels in the Diesel engine is a factor of considerable importance. Although the increased weight of the powerplant is undesirable, the objection to it is less in this than in other branches of transportation, because railroad tracks will readily carry the heaviest railcars and the rolling resistance on rails is low. Low operating cost is the strong point of the Diesel engine, while the outstanding advantages of the Otto engine are low cost of production, due to advances in production methods effected by the automobile industry, and low weight, due to its ability to operate satisfactorily at high speed. The next five years undoubtedly will bring a decision as to which of these two types of engine shall dominate this field.

Decreasing Vibration

IN dealing with cases of objectionable vibration it is often easier to obtain relief by making some change in the vibrating part than by trying to eliminate the primary cause of the vibratory force. At the recent meeting of the Society of Automotive Engineers one prominent engineer told of his experiences with a four-cylinder engine which he had designed for taxicab service. Its performance on the block was fully up to expectations, but when the engine was mounted in a cab its operation was accompanied by vibration and an unpleasant noise.

Various expedients were tried, without success. At about the time when he had decided to make a new start, he accidentally put his foot on the brake pedal—and the unpleasant noise stopped. Obviously the period of the brake pedal lever had some resonance relation to the vibration in the engine. Changing the design of the lever to alter its period eliminated the noise. The same engineer also told of similar results from changing radiator rods and crankcase design.

Another well known engineer told of a car in which objectionable noise was eliminated by placing a Lanchester vibration dampener at the rear of the gearset in the power transmission line. He said that 500 such cars were being driven by owners who had no idea that they had any extra equipment. Subsequently, of course, changes were made in the design which eliminated the necessity for the vibration dampener.

These incidents emphasize the fact that often much can be gained by studying the reaction as well as the action. In the cases cited, elimination of the result was less difficult than the removal of the cause.

Our Industry Today—

Manufacturers, Reassured, Increase Their Schedules—Closed Models Have Stabilized Production—Output Steadily Increasing

NEW YORK, Feb. 9—Automobile manufacturers, reassured by the evidences of increasing demand coming to them from all sections of the country, have increased their 1925 schedules. Leading makers have taken the stand that this year will mark the passing of the so-called seasonal production that in past years has been the cause of unsettlement at regular stated periods. The lower priced closed model of passenger cars has turned out not only to be a settled style, but it also has served the purpose of providing a stabilizer for the market. Henceforth the demand will be spread more generally over all months of the year, in winter as well as in the spring and summer periods.

Expectations were that there would not be heavy winter production this year, as was the case in 1924. Results have gone a little beyond those surmises, although not enough to prove sensational. Winter production, however, has settled down to steadiness, with the tendency gradually upward.

This upward curve will become more pronounced as the demand increases with the coming of more open weather and will not show such great fluctuations in the future as the closed seasons arrive.

The closed model has now become the style. While open cars will continue to have a place in the automobile world, they will cease to be a real factor in the market. Those persons who under past conditions might have used their cars one or two years longer already have come to a realization of the fact that they are out of the prevailing mode.

This has not served to better the used car situation, but it has greatly stimulated new car demand, for Americans, especially with their wealth increased by many millions, are not inclined to be out of date.

Owing to the fact that few, if any, producers are shipping cars in quantities larger than the existing retail demand, the real manufacturing of the year will not get under way until March. However, notwithstanding the fact that February is a short month, with more than the average number of holidays, its schedules will show up in the tables with increases, as also is the case with January.

Revised predictions in important circles are to the effect that 1925 production of motor vehicles not only will pass that of the preceding year, but will come up to the peak figures of 1923, when the 4,000,000 mark was passed.

This will mean prosperity for the makers, as well as quantity figures. The bogey of price cutting evidently has disappeared. One manufacturer already has announced advances in prices, effective this month.

Schedules of close to 20,000 have been sent out by a number of makers, which means almost capacity operation.

G.M.C. Puts Common on 6 Per Cent Basis

Dividend on New Stock Increased to $1.50—Paige Detroit Stock Dividend

NEW YORK, Feb. 11—Directors of the General Motors Corp. at a meeting held here declared for the first quarter of 1925 a dividend of $1.50 a share on the new common stock, payable March 12 to holders of record Feb. 19; also quarterly dividends of $1.75 a share on the 7 per cent preferred; $1.50 on the 6 per cent debenture, and $1.50 a share on the 6 per cent preferred stock, payable May 1 to holders of record April 6.

This is an increase of 25 cents a share over the initial dividend of $1.25 a share, paid on the new common stock Dec. 12, 1924.

Paige-Detroit Declares Stock Dividend

DETROIT, Feb. 11—A stock dividend of 2½ per cent has been declared by the Paige-Detroit Motor Car Co., payable to holders of record March 16, in addition to the regular quarterly cash dividend of 30 cents a share on both the old and new stocks, payable April 1 to holders of record March 14.

At the annual meeting of the stockholders it was voted to change the capitalization of the company from 600,000 shares of $10 par value to 1,000,000 shares of no par value, holders to have the right to exchange share for share, which will leave 400,000 remaining in the treasury.

For the year ended Dec. 31, 1924, the company reports net profits of $1,949,664 after charges, but before Federal taxes, equivalent, after preferred dividends, to $2.97 a share, par $10, earned on the outstanding $6,000,000 common stock. This compares with $3,180,971, or $7.49 a share, on the outstanding $4,000,000 stock in 1923.

Sales for 1924 totaled $39,851,131, compared with $46,292,606 in 1923.

Hupp January Shipments 2599

DETROIT, Feb. 11—Hupp Motor Car Corp. manufactured and shipped in January 2599 cars, as against 2718 in December and 3152 in January, 1924.

Buick Deliveries Increase

DETROIT, Feb. 11—Buick dealer deliveries in the last six months of 1924 totaled 83,000, as compared with the total of 75,000 in the same period of 1923.

Seaman Body Increases

MLWAUKEE, Feb. 11—The Seaman Body Corp., Milwaukee, which makes the inclosed bodies for the Nash plants in Kenosha and Milwaukee, has brought its payroll up to above 2000 men. The body factory has been operating regularly on a 24-hr. schedule for several months and recently reached a peak production of 250 finished bodies in a single day. The Nash company owns a half interest in the Seaman corporation.

Willys-Overland Increases Schedules

TOLEDO, Feb. 11 — Willys-Overland Co., which had laid out a schedule calling for 17,000 cars in February, has increased this to 20,000, while the March schedule, which originally called for 20,000, has been raised to 25,000.

Company officials expect that production for the first three months of 1924 will approximate 60,000 vehicles, or about 16,000 more than in the corresponding period of 1924.

Four-Wheel Drive Gains

CLINTONVILLE, WIS., Feb. 10—The Four Wheel Drive Auto Co. of Clintonville, Wis., manufacturing the F W D motor truck, did a business in 1924 which was fully 50 per cent in excess of the volume in 1923, according to reports of officers to the stockholders' annual meeting. Prospects for 1925 business are regarded as much more favorable than a year ago, and production schedules are being arranged accordingly.

Chevrolet in 1925 Breaks January Sales Records

DETROIT, Feb. 11 — All previous January records for retail sales and orders were broken by the Chevrolet Motor Co. last month, when Chevrolet dealers throughout the country delivered and took orders for approximately 40 per cent more cars than during the same month in 1924 or 1923. The increase in sales is ascribed by factory officials to the introduction of the new Chevrolet.

During the Chicago automobile show 1107 Chevrolets were sold, while five times as many orders are reported to have been taken at the New York show than at any previous exhibition.

Milwaukee Factories Increase Activities

Automotive Manufacturing and Selling Reported as Strongly on Upgrade

MILWAUKEE, WIS., Feb. 11—Manufacturers of automotive units, parts and equipment have contributed materially to a noticeable increase in the number employed by Milwaukee industries since Jan. 1, according to reports for the month. The foundry trade has been particularly active in demands for help, and the machine shop division is now in natural sequence, coming forward for more skilled men.

With factories getting into their stride, shipping specifications on contracts for automotive units and parts are being furnished more readily, making for enlargement of production. The activity has not yet reached the level of a year ago, but by March 1 it is confidently expected that the situation will be favorably comparable.

Retail sales of passenger cars are on the upgrade. They have been stimulated to a degree by mild and favorable weather conditions, which is unusual at this period in this territory.

The beneficial influence of the recent Milwaukee show is being sustained in a most gratifying manner.

New McCord Company Chartered

MILWAUKEE, Feb. 11—The McCord Spring Wheel Co. of Milwaukee has been incorporated in Wisconsin with an authorized capital stock of $400,000 and will take over and transfer from Chicago and Michigan points the manufacture and merchandising of the McCord resilient wheel, at the same time engaging in the production of other automotive specialties.

The incorporators are J. B. Reik, Fred V. Janssen and J. C. McFadden, all of Milwaukee, who represent the interests now behind the McCord enterprise.

Dodge in Six Months Shipped 225,104

DETROIT, Feb. 11—Shipments to dealers by Dodge Brothers in 1924 totaled 225,104 cars, of which 193,861 were passenger and 31,243 commercial. The company reports that the year was the most successful in its history. According to John A. Nichols, Jr., sales manager, practically the entire total of factory shipments represented also retail sales, as dealers' stocks at the close of the year were unusually low.

The Dodge company ended its tenth year with a total of 1,250,000 cars built and sold, of which, according to registrations, more than 1,000,000 remain in service.

Officials expect 1925 to be more prosperous for the company than in 1924 and are rearranging their schedules in accordance with these expectations.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Feb. 11—Further gains were noted in trade and industrial activity last week. Both security and commodity markets, however, showed irregular movements, contrasting rather sharply with the strong upward trend which has continued for nearly three months.

Pig iron production in January amounted to 3,367,264 tons, comparing with 2,961,702 in December and 3,018,890 in January, 1924. The average daily output of 108,621 tons, compared with 95,539 in the preceding month and 97,384 a year earlier, and was the largest since last March.

The production of steel ingots was 4,179,498 tons, as against 3,551,825 in December and 3,633,639 in January last year, while the daily average of 154,796 tons, compared with 136,609 in the preceding month and 134,579 a year ago. The production of steel last month was likewise the largest since March, 1924, which was the maximum for all time.

Freight loadings in January, according to current estimates, were the largest ever achieved during the first month of the year. Loadings from Jan. 1 to Jan. 24 were 5 per cent larger than the exceptionally high totals of last year, and the figures for the entire month are expected to show a corresponding gain.

Bank clearings in leading cities last month, as reported to Bradstreet's, broke all records, reaching a total of $45,246,000,000, as compared with $37,551,000,000 a year earlier. A new high point was established by outside clearings as well as by those in New York City.

Bank debits to individual accounts reported by the Federal Reserve Board for the week ended Feb. 4 amounted to $11,751,000,000, showing an increase of 8 per cent.

Fischer's index of wholesale commodity prices declined last week for the first time in nearly two months, standing at 163.7, as against 164.4 in the preceding week and 162.1 two weeks earlier.

Call money ranged from 3 to 4 per cent last week, rising to 4½ on Monday of this week. Time loan and commercial paper rates were unchanged at 3½ to 4 and 3½ to 3¾ per cent respectively.

Hudson Increases February Schedule

Plans 17,000 Production for Month—March Output Probably Will Be 18,000

DETROIT, Feb. 11—Following the announcement of its January production figures, totaling 16,825, the Hudson Motor Car Co. states that it has increased its February schedule to 700 cars a day, or 17,000 cars for the month. The January production figures compare with 11,660 for the same month last year.

The March schedule, if nothing of a business nature happens to affect it, will be 18,000 cars. During the first six months of 1925 the company plans to build approximately 100,000 cars.

Figured on the basis of profits for the last fiscal year, which were equal to $62 per unit, this would mean greatly increased prosperity for this company.

On this basis, December and January profits would figure out at $1,750,000, or $1.32 a share on 1,320,000 shares of no par common, although actual profits were probably higher.

For January alone it is understood that net was close to $1,500,000. Sales of 100,000 cars at the 1924 profit rate per unit would mean net earnings of $6,200,000, or $4.70 a share for six months.

New Coach Probable

Hudson has been gradually expanding factory capacity. Purchase of the Jefferson Forge Co. plant last year and the recent acquisition of the Clayton & Lambert Co.'s stamping plant have added about 20 per cent to the floor space total.

This expansion is to continue. Capacity at the present time is 1000 cars a day. This shortly will be increased to 1200.

Predictions around here include a three-door coach to sell at about $800, an increase in the dividend rate, a stock dividend, but there are no official confirmations.

Jordan Motor Earns $858,459 in 1924

CLEVELAND, Feb. 11—In a report for the year ended Dec. 31, 1924, the Jordan Motor Car Co. shows net earnings of $858,459 before taxes and adjustments, as compared with $892,595 in 1923. In the latter year the net after interest, taxes and all other adjustments totaled $668,959.

Gross sales of the company during 1924 totaled $12,009,596, as compared with $13,253,829 in the preceding year.

Cash dividends paid during 1924 amounted to $445,977. On Dec. 31, 1924, quick assets were $2,054,194, of which $615,223 was cash, comparing with current liabilities of $377,970, or a ratio of almost 6 to 1. This leaves net working capital of $1,676,224, as compared with $984,505 as of Dec. 31, 1923.

A. M. A. to Establish Equipment Mart

Members Decide to Open Show Room and Sales Place in Chicago

CHICAGO, Feb. 11—Marking what is generally agreed to be the most progressive step ever taken by the organization, members of the Automotive Manufacturers Association at a meeting here unanimously indorsed a plan calling for establishment of a central showroom and sales place for the association's many equipment producers. The new institution is to be known as the Automotive Equipment Mart and will be an exclusive feature of the automotive equipment field.

An option has been obtained on quarters for the mart at South Michigan Avenue and Thirteenth Street.

The plot for the initial floor calls for 46 exhibit spaces, which, it is expected, will be taken in a short time. The next floor will be used as soon as 50 additional spaces have been contracted for. It was ventured at the meeting that all would be in readiness for the mart's operation by March 1.

Member manufacturers will be privileged to use their exhibit spaces for display and demonstration purposes under liberal conditions designed to give each producer in the mart all advantages of a private sample room. The manufacturer may have a representative in charge of his display if he desires, or he may bring his customers to the mart at any time.

To Have Sales Executive

To provide for his representation there at all times, however, arrangements will be made for employment of a sales executive.

No prices will be quoted except by direction of the manufacturers. The executive will look after the manufacturers' interest with the same care as he would employ were he the manufacturers' personal representative, save in the fact that he would push no particular product competitively with others. The big idea is to speed up sales of member manufacturers by the centralized contact arrangement.

All office conveniences are to be furnished the exhibitors and their representatives. The association, of which W. E. Green is secretary, will maintain much larger offices than it at present occupies.

Membership Drive

The floor plan provides for a conference room which will be used, by advance reservations, for sales conferences or other meetings desired. There will be a smaller conference room, where salesmen from the factories or the mart's own salesman can interview buyers. Connected with this room will be the mart manager's office.

It was announced that the cooperative salesroom will be advertised constantly in leading publications as a means of attracting to it the attention of equipment buyers. The expense of the advertising campaign, as well as all other mart expenses, will be carried by the mart, rather than the association, the idea being to make the mart fully self-sustaining.

There will be a membership drive which the association will continue from the present time to April 1.

The Feb. 6 meeting of the A. M. A. was designated as "Howard E. Patterson Night," in honor of the association's former president.

Says New York Buses Are Illegally Operated

NEW YORK, Feb. 9—In his report to Governor Smith on the transit situation in New York City, Supreme Court Justice John V. McAvoy, acting as commissioner, placed blame for the congestion upon Mayor John F. Hylan and other members of the Board of Estimate. Charges against the Transit Commission, headed by George F. McAneny, were found to be without foundation.

In his report upon the bus situation, Justice McAvoy said:

> The bus lines in the City of New York which are now, according to rulings of the courts, illegally operated, should be required to make applications for franchises and certificates to convenience and necessity under the existing law, to the end that the City of New York may receive a proper percentage of the income derived from the buses, the service be improved and the responsibility for the proper operation of these vehicles be fixed, until such time as the right of the municipality to operate such lines has been established in the courts or by new legislation and the municipality shall have determined to operate this service.

British Select Sept. 12 for Motorcycle Show

LONDON, Feb. 2 (*by mail*)—The earliest motor show on record, so far as England is concerned, will result from the date of this year's Olympia Motor Cycle Show, which has been fixed for Sept. 21 to 26. This early opening is due to the booking by the passenger car and truck show organizers of Olympia for October and the beginning of November. September is considered a more suitable period than late November for the motorcycle exhibition.

AUTOMOTIVE PATENT REPORT

WASHINGTON, Feb. 11—The automobile industry ranked second during 1924 in its relation of applications filed with the patent office of the United States for new patents on accessories, parts, tires and automotive equipment. It was exceeded only by the radio industry. A report of this government agency, just filed with Congress, shows that during the last calendar year a total of 101,134 applications of all kinds were received during the year, from which the total receipts amounted to $3,176,622.

Michigan Changes Act to Weight Basis

Car License Fixed at 55 Cents Per 100 Lb.—Gasoline Tax Two Cents

DETROIT, Feb. 11—Under a revision of the automobile license act in Michigan, passenger cars will be licensed at the rate of 55 cents per 100 lb., with a separate schedule applicable for trucks, trailers and other motor vehicles. The horse power feature of the former tax is revoked, the licensing now being entirely by weight.

A two-cent tax per gallon of gasoline is also now set up in this State, both legislative actions having become immediately effective upon passage.

Effort will be made by the Detroit Automobile Club to compel the submission of the gasoline tax to referendum vote on the ground that funds raised by it are not required for the State's highway work or road bond obligations.

Court action on the matter may hold application of the tax over for several months. In the meanwhile, however, the State is taking action toward the immediate collection of such tax.

Commercial vehicles are defined under the act as "all motor vehicles used for the transportation of passengers for hire and those constructed or used for the transportation of goods, wares or merchandise."

Weight and Tax Schedule

The schedule of commercial vehicle weights and tax is as follows:

Up to 2500 lb.	$0.65
2500 to 4000 lb.	.80
4000 to 6000 lb.	1.00
Over 6000 lb.	1.25
Trailers	
Up to 1000 lb.	.50
Above 1000 lb.	1.00
For each motor cycle	4.00
For each motor bicycle	2.50

The Secretary of State may accept the manufacturer's weight or the weight shown in the shipping bill. This means that the department will accept a fixed weight unless the manufacturer does not cooperate, in which case the department will weigh a car and fix its own rate.

Dealer licenses will be issued under the act on a basis of $45 for the first three sets of plates and $5 for each additional paid. These can be used in any way connected with the general conduct of business and on used cars which have plates from the former year which are being offered for sale. It does not permit their use on pick-up or service wagons. Dealers using plates contrary to law may have them taken up after a hearing.

PLANS BULL DOG DRIVE

SPENCER, IOWA, Feb. 10—At a sales conference this week, the W. H. Thomas Manufacturing Co. announced the completion of aggressive plans for merchandising the Bull Dog foot accelerator and the Bull Dog three way carbureter control for Fords.

Gasoline Price Rise Causes U. S. to Act

President Warns Against Increase and House Committee Starts Investigation

WASHINGTON, Feb. 11—A warning that the government will investigate the increasing prices of gasoline has been sounded by the Department of Justice and also by President Coolidge, following almost simultaneously advances throughout the country. In Washington the increase has been five cents a gallon in ten days.

Spokesmen declared that high prices for gasoline are looked upon with disfavor by the President, who pointed out that one of the fundamental reasons for the creation of the Federal Oil Conservation Board was the hope that there might be developed methods of production which would do away with rising prices.

The gasoline situation also has been taken up by the House, which has ordered an investigation. Officials of Standard Oil, the Texas Co. and others have been asked to appear before the House Committee and explain the extraordinary and rapid increase in gasoline prices.

The data obtained before the House Committee will be turned over to the Department of Justice for action. A preliminary report from the Bureau of Mines, which was obtained by Congressman Frederick N. Zihlman of Maryland, and author of the gasoline investigation resolution, declares that, while a slight increase in price of gasoline might be warranted, based on increased crude oil prices, the increases, amounting in some territories to from 25 to 33 1/3 per cent, were unwarranted.

An explanation of the increase, made by the Penn Oil Co., which will be read into the records at this week's hearings, sums up the present gasoline situation as follows:

> Crude oil recently has jumped from 15 cents to 50 cents a barrel. A barrel contains 40 gallons and makes about 20 gallons of gasoline. The advance has been due to a shortage; the shortage to cessation of production; cessation of production to a surplus on hand.

Just such conditions as this, spokesmen for the President point out, can be obviated by the program now being considered by the recently appointed Federal Oil Conservation Board.

LEE TIRE TO INCREASE CAPACITY

YOUNGSTOWN, OHIO, Feb. 11—Production of inner tubes is being transferred by the Lee Tire & Rubber Co. from its Conshohocken plant, near Philadelphia, to the Youngstown property of the Republic Rubber Co., a subsidiary. Capacity here will be increased within 60 days from a present daily maximum of 3500 tubes to 10,000. This and other production enlargements under way will expand the working force at the plant here 10 per cent. Republic is now showing profits from operation and the outlook for steady operation is bright.

Egyptians to Study U. S. Road Building

WASHINGTON, Feb. 11—Two engineers of the Egyptian government have been sent to this country for the purpose of making an exhaustive study of road building and maintenance, as carried on through the cooperation of the United States Bureau of Public Roads.

Dr. Halim Abdelmalek and M. Hassaam, the two engineers, reported to the Egyptian legation and were introduced to the various government departments through which they will make their study. Dr. James R. Mood of the Department of Commerce has been designated by this government to assist them in their study.

Peerless January Output Increased 30 Per Cent

CLEVELAND, Feb. 11—The Peerless Motor Car Co. of this city increased production in January, 1925, by 30 per cent over the number of cars manufactured in January, 1924. D. A. Burke, president, stated that the increase was made to take care of actual orders from dealers and distributors.

Notwithstanding the big increase in production, there are more orders on hand than at the same time a year ago.

Mr. Burke reports that the business pulse of the nation has quickened perceptibly in the last month. He regards continued improvement through the spring a certainty.

Memphis, Tenn., Leads in Reducing Fatalities

NEW YORK, Feb. 11—To Memphis, Tenn., is awarded the place of honor by the National Automobile Chamber of Commerce in its compilation of 1924 traffic records. It leads all other cities in the success with which it has reduced its motor fatalities during the year.

The reduction as reported by the Memphis Safety Council is 44 per cent, the 47 mortalities of 1923 having been reduced to 26 in 1924. Oakland, Cal., was given second place, San Francisco third, Denver fourth, Bridgeport, Conn., fifth, Hartford sixth, and Chicago seventh.

Reports from 537 cities gave a total of 748 fatalities during December, with the expectation that 1924 totals, when finally compiled, will show a worse record than 1923 for the country at large. Total motor fatalities for 1924, as reported to date, are given as 7665.

BUSES REPLACE STREET CARS

DETROIT, Feb. 10—Street cars in Ann Arbor, near here, have been replaced by motor buses, according to A. D. B. Vanzandt of the People's Motor Coach Co. The use of motor coaches is to be an experiment for one year.

Gasoline Production Reaches New Record

Stocks on Hand Stood at 1,179,503,185 Gallons in December, Says U. S. Report

WASHINGTON, Feb. 12—Gasoline production in the United States during December broke all previous records, the Department of the Interior has announced here in reviewing statistics compiled by the Bureau of Mines.

This record output of gasoline was accompanied by record breaking yields of kerosene, gas oils and fuel oils. December crude run to refineries totaled 57,880,491 barrels, of which all but 3,306,378 barrels was domestic crude, the largest monthly run ever recorded.

The output of gasoline for the month was 795,613,195 gal., a daily average of 25,665,000 gal., this latter being an increase of 1 per cent over the daily average of the previous month, and an increase of 20.7 per cent over that of December, 1923. Both total monthly and average daily production figures are the highest ever recorded. As in 1922 and 1923, gasoline production reached its peak in the month of December.

Domestic demand or consumption of gasoline was 661,338,947 gal., a daily average of 21,333,500 gal. This represents a decrease in daily average consumption from the previous month of 8 per cent, but is an increase of 27.6 per cent over the daily consumption of December, 1923. Total exports during December were 101,000,000 gallons, a slight increase over the total for November.

Stocks on hand increased 46,000,000 gal. during the month, standing at 1,179,503,185 gal. Dec. 31, 1924. This was the first time since May that stocks have shown an increase. These stocks represent 55 days' supply at the December rate of domestic demand. This compares with 64 days' supply on hand a year ago and 48 days' supply on hand a month ago.

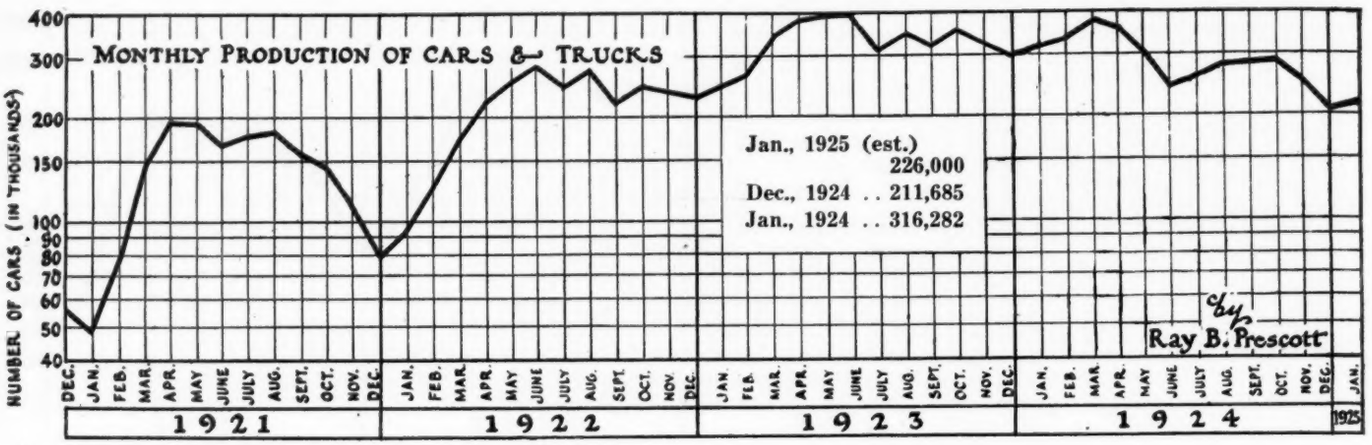
New Models Produced by Huffman Company

ELKHART, IND., Feb. 11—The Huffman Brothers Motor Co. is now manufacturing the Huffman six-passenger automobile in five body styles. These are: A roadster at $1,395, a touring car at $1,395, a sport touring car at $1,495, a three-passenger cabriolet at $1,695, and a sedan at $2,295.

The engine is an 8-R six-cylinder Continental with 3¾ in. bore and 4½ in. stroke. The clutch is a Borg and Beck. Lubrication is by force feed and splash. The wheelbase is 120 in. Semi-elliptic springs are used, those in front being 37 in. long and those in the rear 56 in. long.

The Huffman Co. also announces two new trucks, the model E 1½-ton at $1,790, and the model BH 2-ton worm drive at $1,990.

JANUARY OUTPUT IS PLACED AT 226,000



January Production, Placed at 226,000, Is Up 8 Per Cent

NEW YORK, Feb. 11—Production totaling 226,000 cars and trucks in January, 1925, is indicated in reports submitted to the National Automobile Chamber of Commerce here.

This estimated output for the first month of the year is an increase of 8 per cent over December, 1924, and a decrease of 29 per cent from that reported for January, 1924.

53,000 Buses in U. S. and Canada, Says Loomis

NEW YORK, Feb. 11—According to Edward F. Loomis, secretary of the National Motor Truck Committee, National Automobile Chamber of Commerce, 12,500 buses and vehicles used for buses were built and placed into service during 1924. In estimating the total number of passengers who rode in buses last year at 2,500,000,000, Mr. Loomis points out that the bus is fast assuming a major position in the transportation system of the country.

When added to buses in operation prior to 1924, these new vehicles bring the total number of buses in service in the United States and Canada on Jan. 1 to 53,000, according to Mr. Loomis. The gain during 1924 represents approximately 25 per cent of the total now in use. Other figures obtained from bus operators forecast a corresponding growth during the present year.

Bus Use on Increase

The figures and estimates place the total present distribution at 52,925.

That electric railways realize the possibilities of the bus as a transportation medium, Mr. Loomis says, is attested by the fact that while only 1200 buses were used in this field on Jan. 1, 1924, no less than 3000 were used on Jan. 1, 1925. This represents an increase of 150 per cent. Three steam railroads are also operating buses in common carrier service through subsidiaries.

January Production Estimate Shows 8 Per Cent Increase as Compared with Output of Factories in December

NEW YORK, Feb. 11—Figures compiled by the National Automobile Chamber of Commerce for January, 1925, give an estimated production of 226,000 cars and trucks, an increase of 8 per cent over the preceding month and a decline of 29 per cent, as compared with January, 1923.

The following table gives the statistics for January of 1924 and 1925:

	Output		Carloads		Driveaways		Boat	
	1925	1924	1925	1924	1925	1924	1925	1924
January	226,000	341,000	32,100	43,000	19,900	30,000	332	700

Factory shipments for the other months of 1924 and 1923 and output for 1924 follow:

	Output		Carloads		Driveaways		Boat	
	1924	1923	1924	1923	1924	1923	1924	1923
February	367,532	276,960	52,224	36,137	42,594	43,620	427	882
March	382,494	355,097	54.545	44.995	41,555	63,017	495	1,888
April	373,214	382,763	48,030	46,102	37,741	60,483	4,156	5,028
May	312,876	394,217	35,510	45,402	32,756	62,357	8,338	12,818
June	245,829	378,618	26,046	40,291	25,205	59,110	7,321	13,494
July	262,919	328,121	27,166	32,837	26,190	46,946	7,297	10,135
August	279,075	345,315	30,200	38,371	28,240	45,936	7,538	10,055
September	290,981	327,556	32,754	36,030	28,124	39,689	7,150	8,466
October	289,370	365,194	32,500	42,309	28,450	37,970	5,750	7,673
November	228,575	313,024	29,200	37,537	23,000	31,305	5,000	6,538
December	*211,665	303,241	*31,852	36,113	*20,814	30,330	*900	3,984

*Partly estimated.

Motor vehicle production segregated as to cars and trucks is as follows:

	1924	
	Cars	Trucks
January	287,353	28,929
February	336,371	31,161
March	348,356	34,138
April	337,045	36,169
May	279,455	33,421
June	217,935	27,894
July	237,668	25,252
August	251,551	27,524
September	260,171	30,810
October	257,915	31,455
November	201,575	26,884
December	*189,000	*21,000
Total	3,204,395	354,637

*Estimated.

DURANT ON OIL BOARD

NEW YORK, Feb. 11—At the annual meeting or stockholders of the Independent Oil & Gas Co., W. C. Durant, the automobile manufacturer, was elected a director.

DURANT OPENS NEW OFFICE

NEW YORK, Feb. 11—Durant Motors, Inc., has announced the opening of a wholesale office in the Jefferson Standard Building, Greensboro, N. C., in charge of W. T. Minor as sales manager. This wholesale office will direct Star and Durant sales in both North and South Carolina.

Thirteen wholesale offices have been opened by the Durant company since July, 1924, according to a statement by officials.

Studebaker Adds Four New Body Types

Company Is in Production on Models Brought Out Since Jan. 1

SOUTH BEND, IND., Feb. 11—Since the first of the year Studebaker has added four additional body types to its lines. Several of these were exhibited at the New York and Chicago shows. The company is now producing them. The new bodies are:

The coach, mounted on the Standard Six chassis.

Four door brougham on the Standard Six chassis.

Four door brougham with trunk rack on Special Six chassis.

Sport roadster on Special Six chassis.

The coach, priced at $1,295, is of the two-door type with full metal panels. The doors are unusually wide, and passengers can get in or out of the rear seats without disturbing the occupants of the front seats. The back quarter windows are crank operated. The upholstery is a new pile fabric, mohair and wool, in blue-gray for the sides and headlining, and of the same color with a gray stripe effect on the seats.

The Standard Six brougham is of the four-door type and lists at $1,465. Like the coach, it is mounted on full balloon tires. The body is all steel, excepting for the leather covered top and rear quarters.

The Special Six brougham has four doors and comes equipped with winged radiator cap, Moto-Meter, aluminum bound trunk rack, one-piece windshield, rear view mirror, automatic windshield cleaner and full balloon tires. The price is $1,795.

The Special Six sport roadster is characterized by an unusual amount of what is ordinarily extra equipment. The body is finished in Commache brown lacquer, the upper half being in black leather. The louvers are striped in ivory, and the cowl lamps and cowl ventilator are finished in black. An ample space for carrying parcels is provided, and the car is priced at $1,535.

Studebaker Reduces Prices in England

LONDON, Feb. 2 (*by mail*)—Improvement in the sterling rate of exchange, together with the fall in price of raw materials, probably will produce price cuts in American cars in Britain. Studebaker has already taken this step.

The standard six touring saloon now sells for £395; the standard six coach-built 5-seater, 4-door saloon, £520; the special six touring saloon, £495; the special six coach-built 5-seater, 4-door saloon, £640; the big six touring saloon, £575, and the big six coach-built 7-seater, 4-door saloon, £765.

Purchasers who have already accepted delivery are being refunded the difference between old and new prices.

The decision made by domestic motor manufacturers not to exhibit at the British Empire Exhibition at Wembley this year is a sign of strength rather than of weakness.

Keaton Tire Completes Factory on Pacific Coast

SAN FRANCISCO, Feb. 11—Completion of the Keaton Tire factory here is announced by R. H. Keaton, president and general manager. Keaton non-skid tires have been manufactured in the East for years, but Keaton has now completed an elaborate plant in the manufacturing district of this city, equipped with the most modern tire making machinery. From now on the company will build the casing in San Francisco.

Appointment of Frank Marisch, local man and well known tire salesman, as special factory representative to cooperate with the local Keaton branch to promote sales in the San Francisco territory also was announced by Mr. Keaton.

N. A. C. C. Men to Go to Transport Meetings

NEW YORK, Feb. 11—Three members of the National Automobile Chamber of Commerce staff have completed arrangements for long journeys in the interest of the organization and the industry.

James S. Marvin, assistant general manager and chairman of the freight traffic conference of the industry, will go to the Pacific Coast to confer with dealers and attend hearings set by the Interstate Commerce Commission at San Francisco Feb. 26.

Pyke Johnson, secretary of the Highways Committee, has been delegated to attend the Pan-American Road Conference and International Chamber of Commerce Economic Conference at Buenos Aires, Argentina, in May.

George F. Bauer, secretary of the Foreign Trade Committee, will represent the chamber at the meeting of the International Chamber of Commerce at Brussels, Belgium, in June.

John N. Willys, chairman of the Foreign Trade Committee, also is expected to attend that gathering.

While in Europe Mr. Bauer also will visit France, Germany, Austria, Switzerland, Holland and England in connection with export plans, following the foundation laid by Alfred Reeves, general manager of the N. A. C. C., upon his visit with dealers and manufacturers in those countries last year.

MACK EARNS $18 A SHARE

NEW YORK, Feb. 11—Mack Truck, Inc., preliminary report for 1924 shows net income of $6,200,000, equivalent to approximately $18 a share on the common stock outstanding, compared with a net income of $7,003,665, or $20.71 a share, on the common, in 1923.

Ford to Construct New Type Airship

Building of Dirigible Move to Start Passenger Service Between Detroit and London

DETROIT, Feb. 11—In a move to establish a three-day passenger air service between Detroit and London, a new type of rigid metal dirigible is to be made for the United States Government in the Ford Motor plant at Dearborn, the Aircraft Development Corp. has announced. The contract for the construction of the new ship, it is expected, will be signed by the government within 30 days.

The corporation, of which Edsel B. Ford is a director, will fabricate the dirigible at Dearborn, and it will be assembled at Scott Field, Belleville, Ill., controlled by the army air service.

The ship will have a "skin" of special duralumin plates, only eight one-thousandths of an inch thick, which will be six times stronger than the present fabric coverings of dirigibles. It will be fireproof, weatherproof and navigable in practically any sort of weather. It will be of 15,000 lb. displacement and will have an approximate capacity of 200,000 ft. of helium gas. The length will be 150 ft. and the diameter 53 ft.

Plans for making the new craft lightning proof are said to have been completed by Thomas A. Edison. Further plans have been made by the inventor to give it perfect electrical conductivity and to prevent aerial friction and accumulation of static.

The power plant will include two Lawrence air-cooled engines of 200 horsepower, to be placed aft of the central control car, which will equal the size of a railroad club car.

Eight steerage fins will be provided instead of four.

Ford to Grow Flax for Making Fabrics

DETROIT, Feb. 10—The Ford Motor Co. is preparing for the extensive growing of flax for use in fabric manufacturing and upholstery. Acreage for this purpose is being obtained in the farming districts within 200 miles of the Detroit factories, centering about Ovid, Mich.

According to the indicated plans, the machinery for preparing the flax will be installed at this point. The flax, it is understood, will replace cotton to a certain extent for certain manufacturing purposes.

ROBERTS JOINS RED SEAL

NEW YORK, Feb. 11—M. J. Roberts, well known in automobile racing circles, has been appointed sales manager of the petrometer division of the Red Seal Refining Corp. and will have charge of the distribution of the dash gasoline gages for automobiles.

$75,000,000 Road Bill Is Passed by Senate

Measure Provides for Federal Highway Aid in 1926 and 1927

WASHINGTON, Feb. 12—Authorizing appropriations for Federal aid to the States in highway construction in the sum of $75,000,0000 each for the fiscal years of 1926 and 1927, the Sterling-Dowell road bill has passed the Senate. The bill now goes to the House for concurrence in some minor changes, and then to President Coolidge for his signature.

Before passing the bill by a vote of 66 to 5, the Senate defeated all amendments proposed which sought to reduce the proposed appropriations.

In addition to the $75,000,000 appropriations for 1926 and 1927, the bill for each of these two years authorizes $7,500,000 for construction of forest roads and trails.

How the automobile industry could not have developed as it has, except for the movement for good roads which has already given the country a number of interstate routes, was told the Senate by Senator Phipps of Colorado during the four days' debate which preceded action on the measure.

Commercial Features Important

It was brought out during the debate that the commercial features of the transportation over good roads are most important.

In regard to this Senator Phipps said:

The transportation of farm products to the markets has been rendered possible by the construction of good roads where hitherto the railways had to be depended upon almost exclusively, meaning that produce had to be transported greater distances.

It is not only that the farm products shall come into the consuming centers, but also that the products of manufactureres may be delivered and distributed to the consumers over these good roads by the use of trucks. That is being done today at less cost for transportation than was paid to the railways for similar service.

Senator Sterling of South Dakota, sponsor of the good roads bill in the Senate, gave some interesting statisics. He said:

The total apportionment to States up to Dec. 31, 1924, was $525,125,000. The balance of apportionment as yet unallotted to projects in the several States is $55,626,523. The total so far allotted to projects is $469,498,476.

57,263.2 Miles Allotted

As to the number of miles that have been constructed and the number of miles of projects for which allotments have been made, the total is 57,263.2 miles, of which there are completed projects amounting to 41,667.8 miles and projects are under construction amounting to 13,286.8 miles and projects approved by the Department of Agriculture for construction amounting to 2,308.6 miles, or a grand total of 57,263.2 miles.

Projects completed have involved expenditures amounting to $324,933,647 and embrace 41,667.8 miles. Projects now under construction involve the payment of $127,946,664, and projects approved for construction $16,618,135. The balance of the apportionment not yet placed under construction is $72,244,658.

The total payments to the various States of the Union made up to Dec. 31 last were $380,528,813. There was paid to the States during last month—the month of January, 1925, the sum of $8,272,369, leaving cash on hand Feb. 1, 1925, $16,691,317.

Automobile Merchants Feast in New York

NEW YORK, Feb. 11—At the annual meeting of the Automobile Merchants Association of New York, at which more than 400 were present, the following directors were elected to serve for two years: S. B. Bowman, S. B. Bowman Auto Co.; W. L. Colt, Colt Stewart Co.; L. J. Eastman, Packard Motor Car Co.; J. B. Hulett, Hulett Motor Car Co., and H. L. Stratton, Stratton Bliss Co.

Following the business meeting the association held its first annual banquet at the Plaza, the opening speech of which was made by J. B. Hulett, the president. He reported an increase in membership of about 50 per cent during the year. All of the speakers predicted heavy buying in the spring. S. B. Bowman was chairman of the evening.

Among the guests of honor were Charles M. Brown, Glenn Tisdale, Lee J. Eastman, past president of the association; Dominick Henry, retired deputy chief inspector of the New York Police Department; Inspector M. T. Ahearn, in charge of traffic; Capt. Anthony Howe, in charge of the motorcycle squad, and Capt. Harry Easton, in charge of the traffic division.

New York Traffic Doubles Every Three Years

SYRACUSE, N. Y., Feb. 11—Automobile traffic on New York State highways is increasing at the rate of 100 per cent every three years, according to Col. William M. Acheson, division engineer of the State Highway Department, addressing a conference of road builders here. To meet the needs of this increased traffic roads must be widened and built stronger, he said.

He pointed out that the solution seems to be toward 10-ft. traffic lane units. The old 16-ft. road is a thing of the past and cannot meet the needs of the traffic demand unless widened, he said.

DANISH TAX EXTENDED

WASHINGTON, Feb. 11—The imposition of the Danish automobile sales tax has been extended for two years with slight changes in the method of application, Commercial Attache Sorensen advises the Department of Commerce. When the price of the car exceeds 15,000 crowns, the sales tax on the amount exceeding 15,000 crowns has been increased from 30 to 40 per cent.

Liability Insurance Sought in Coast Bills

Five Measures Introduced in California Legislation Require Yearly Premiums Up to $10,000

LOS ANGELES, Feb. 10—Five bills were introduced at the first half of the session of the California legislature to require compulsory liability insurance of all owners of motor vehicles. The amount of insurance the authors would require varies up to $10,000 per year.

One bill would make the owner of any vehicle liable for the death or injury to person or property from negligence of its operation. The phraseology of the bill would apply to the legal owner of the vehicles. The author maintains that this is his intent, because usually the legal owner is a dealer, finance company, bank or other financially responsible person, while the registered owner in many cases would be without assets.

Another bill would make it mandatory to suspend the license of a motor vehicle operator for six months upon the third conviction of violation of the motor vehicle act. There is no discrimination as to the seriousness of the violation.

One bill would require a mechanical governor on every commercial vehicle and make failure to so equip a misdemeanor. The charge is made that this bill is framed as to favor a certain make of governor. A similar bill, not so drastic in its provisions, was defeated at the 1923 session.

Commercial Vehicles Aimed At

Commercial vehicles are aimed at specifically in a number of other bills. One of these would put every such operator under the jurisdiction of the railroad commission. One would impose a tax of 4 per cent of the gross receipts on all commercial vehicle owners, including those used for making deliveries by owners who set up a cartage charge, but do not operate exclusively for compensation.

This is said to be aimed at the lumber companies, wholesale grocers, flour mills and others using trucks for delivery and charging cartage on the basis that they use the highways just as extensively or more so than do the operators for hire.

The two bills would prohibit the issuance of a license to operate a motor vehicle or the registrations thereof without a certificate from the county assessor showing that the personal property tax has been paid.

There also are bills that would require a heavy increase in the weight fees paid by commercial vehicles.

DUTY MOTOR PLANT SOLD

ELGIN, ILL., Feb. 4—The plant of the Duty Motor Co., once a flourishing industry of Elgin and which later became the American Steam Truck Co., was sold at auction for $30,100 to E. M. Levy of Chicago.

FINANCIAL NOTES

White Motor Co. sales of $46,500,000 for 1924, as reported last week, showed a decline of $2,376,000 as compared with the preceding year. Earnings dropped $2,800,000 or from $6,964,666 in 1923 to $4,100,000 in 1924. Net in 1924 was equaled to $8.20 a share on the 500,000 shares of capital stock, which is the corporation's only outstanding liability, against $13.92 a share in 1923. Unit sales in 1924 were lower than in 1923, due chiefly to the severe depression on the Pacific Coast, where the company has been doing 25 per cent of its business. As the company in 1924 paid out less than half its earnings in maintaining the 1924 dividend, surplus increased $2,100,000 to $11,534,000, against $9,425,739 Dec. 21, 1923.

Mullins Body Corp. reports for the year ended Dec. 31, 1924, net profit of $299,715 after charges and Federal taxes, equivalent after preferred dividends to $2.22 a share earned on the 100,000 no par stock, compared with $103,135, or 25 cents a share, in 1923. Balance sheet as of Dec. 31, 1924, shows profit and loss surplus of $3,931,118, against $4,547,875 Dec. 31, 1923. Cash was given as $21,463, against $573,447; accounts and notes receivable $462,706, against $281,886 and accounts and notes payable as $180,906, against $1,038,769.

Chandler Motor Car Co. directors meet early in March and no change in the $3 annual dividend rate established last June is anticipated. It is estimated that the company in 1924 earned about $1,250,000, or $4.50 a share on the 280,000 shares of no par common stock outstanding. This would compare with net income of $2,055,267, or $7.34 a share, in 1923. No difficulty in earning the $3 dividend in 1925 is expected.

General Motors Acceptance Corp., according to Curtis C. Cooper, president, in the six months ended Dec. 31, 1924, transacted (partially estimated) a total business of $819,610,000, divided as follows: Wholesale, $353,846,000; retail, $377,873,000, and foreign, $87,891,000. In the year 1924 the business was: Wholesale, $125,055,000; retail, $32,433,000, and foreign, $32,433,000, or a total of $263,296,000.

Ajax Rubber Co., Inc., announced to the New York Stock Exchange that holders of capital stock of record Feb. 9, 1925, have the right to subscribe at $10 a share for stock of no par value to the extent of three shares for each 17 shares held. The right to subscribe expires March 2, 1925. Net profits for the fiscal year 1924 approximated $650,000, or slightly in excess of $1.50 a share on the common.

Hudson Motor Car Co., according to Auerbach, Pollak & Richmond, at the end of 1924 had a working capital of $16,171,835, against $3,464,484 at the close of 1921, a gain for the period of $12,707,350. Surplus was $24,202,043, against $10,508,287 at the end of 1921. Cash as of Nov. 30, 1924, was $12,876,721, as compared with $1,282,565 Nov. 30, 1921.

Allis-Chalmers Manufacturing Co. for the last quarter of 1924 reports net profit of $808,935 after Federal taxes, equivalent after preferred dividends to $2.02 a share on $27,770,750 outstanding common, compared with $824,561, or $2.07 a share, in the preceding quarter, and $849,547, or $2.17 a share, in the last quarter of 1923.

International Nickel Co. for the nine months ended Dec. 31, 1924, shows net income of $1,633,974, against $788,191 in the same period of 1923. This is equal, after preferred dividends, to 73 cents a share on the common, against 23 cents earned on the common in the last nine months of 1923.

Trumbull Steel Co. for the year ended Dec. 31, 1924, reports net earnings of $2,243,888 after charges, depreciation and Federal taxes. Current assets were given as $18,243,447 and current liabilities $8,244,659. Gross sales totaled $26,201,521, against $31,205,615 in 1923.

Curtis Aeroplane & Motor Co. has declared a semi-annual dividend of 3½ per cent on its preferred, increasing the rate from 5 to 7 per cent, payable March 2 to stock of record Feb. 15.

Timken Roller Bearing Co. has declared an extra dividend of 25 cents, in addition to the regular quarterly dividend of 75 cents, both payable March 5 to stock of record Feb. 17.

Niles-Bement-Pond Co., maker of tools, reports for the year ended Dec. 31, 1924, a net loss of $1,185,808, compared with a loss of $555,387 in 1923.

Martin-Parry Corp. directors have declared the regular quarterly dividend of $1 a share, payable March 2 to stockholders of record Feb. 14.

Hayes Wheel Co. has declared the regular quarterly dividend of 75 cents a share, payable March 16 to stock of record Feb. 28.

Replogle Steel Co. reports net earnings of $1,234,718 for 1924, against $76,362 in 1923.

Johns-Manville Earns $2,223,047 in 1924

NEW YORK, Feb. 10—A net profit of $2,223,047 for 1924, after all expenses, charges and reserves for taxes, against $3,078,928, is reported by Johns-Manville, Inc. This net profit is equal to $8.89 a share on the 250,000 shares of no par value stock outstanding, against $12.31 a share earned on the capital stock in the previous year.

Balance sheet as of Dec. 31, 1924, shows current net assets of $18,702,357, including inventories valued at $3,621,434; cash, notes and accounts receivable of $7,293,407, and dividend paying securities amounting to $7,787,515. Current liabilities are shown as $1,780,826.

India Tire Sales Gain 54 Per Cent in 1924

AKRON, Feb. 11—India Tire & Rubber Co. 1924 net sales were $3,021,767, an increase of $1,061,454, or 54 per cent over 1923, according to the report of President J. M. Alderfer at the annual meeting. This gain was accomplished with a 25 per cent increase in sales expense, officials stated.

After paying preferred dividends and 6¼ per cent on common, $326,882 was added to reserve and surplus. India is capitalized for $1,100,000.

The company reports prospects for a material increase in business this year. With the plant addition nearing completion, India will be in a position to manufacture between 1500 and 1800 tires daily, which production for next twelve months practically has been contracted for.

Goodyear Doubles Earnings in 1924

Net for the Year Equal to $7.78 a Share on Common—Sales $115,323,173

NEW YORK, Feb. 11—After allowing for all selling and operating expenses, fixed charges and other deductions, Goodyear Tire and Rubber Co. for the year 1924 reports net income of $12,161,540, as compared with $6,507,245 in 1923. Dividends applied on the prior preference stock aggregated $1,149,100, leaving a surplus of $11,012,440.

The surplus, after allowing for dividend requirements on the company's 7 per cent cumulative preferred stock, left a balance equal to $7.78 a share earned on the 831,585 shares of no par value common stock outstanding. In 1923 the earnings on the common stock totaled approximately 90 cents a share.

Net sales are given in the report as $115,323,173, against $106,026,110 in 1923.

As of Dec. 31, 1924, the general balance sheet shows current assets valued at $59,647,342, including $11,494,120 cash, $4,000,000 call loans, $3,135,000 in marketable securities, $31,051,513 inventories, and $9,996,710 in notes and accounts receivable. Current liabilities totaled $6,785,767, including $5,309,525 accounts payable, $1,176,241 accrued interest and bond premiums and $300,000 accrued dividends. The ratio of current assets to current liabilities is approximately 9 to 1.

Commenting on the report, E. G. Wilmer, stairman of the directors, states that "dollar sales for 1924 have been exceeded in the past, but only due to the high selling prices of the war and postwar years." He adds that in point of physical volume, the number of tires sold through Goodyear dealers was considerably in excess of that of any previous year.

In regard to the cash and securities held by the company and to the outlook, Mr. Wilmer says:

> Due to the higher volume of business now being handled and the higher costs of rubber, cotton and other materials, much of the cash on hand at the first of the year will shortly be required for working inventories.
>
> Selling competition is still keen. But careful administration, coupled with Goodyear's financial position, the healthy state of its organization and the high level of public acceptance which its products now enjoy, should assure us our full share of profitable business.

DAVIS RUBBER DIRECTOR

NEW YORK, Feb. 11—John W. Davis, who resigned as director of the United States Rubber Co. when he was nominated Democratic candidate for President, again has been elected a director and appointed general counsel of the company.

Men of the Industry and What They Are Doing

Keim Resigns from Rolls-Royce

S. de B. Keim, who has been general sales manager of the American works of the Rolls-Royce Co. since its establishment in 1920, has resigned. He has not completed plans for his future work.

Jackson Made Unique Manager

E. W. Jackson, formerly with the General Automotive Corp., has been made manager of the Unique Spark Plug Cleaner Co., Chicago, manufacturer of the Instant spark plug cleaner.

Clark Goes to Europe

Herbert Clark, sales engineer of the Spicer Manufacturing Corp. and Associated Spicer Cos., sailed Feb. 7 to represent these organizations in the European markets. His headquarters will be at 56 Ludgate Hill, London, E. C. 4. Mr. Clark will seek to develop European business for Spicer propeller shafts, Huck axles, Sheldon axles and springs and Bil-Cox bumpers.

Guthrie Becomes Lima Official

W. G. Guthrie has been appointed vice-president of the Lima Sheet Metal Products Co., Lima, Ohio. Mr. Guthrie has been associated with the automotive industry for the last 15 years, during which period he has held responsible production positions. Among other organizations with which Mr. Guthrie has been associated are the General Motors and Willys corporations.

Pile Becomes United Supervisor

J. Howard Pile, for the last seven years technical editor of Motor World, has been made supervisor of the Harrison radiator service division of the United Motors Service, Inc., New York branch. Mr. Pile has been identified with the service end of the industry in New York for many years and in addition to his editorial work has acted as consultant in service matters to a number of firms. He was one of the organizers of the Automotive Service Association of New York, was its first secretary and general manager and at present is the treasurer. His new work will be building up the radiator repair business of United Motors Service in the Metropolitan territory.

Searles Made Sales Manager

Paul C. Searles, treasurer of the India Tire and Rubber Co., Akron, has been made general sales manager of the company. Mr. Searles will have as his assistants Harry Corbett and Lynn Harvey, who will serve as divisional sales managers.

Ford on Congressional Commission

Henry Ford has been named a member of the congressional commission which will conduct the celebration of the 200th anniversary of the birth of George Washington to be held in Washington in 1932.

Rogers Made Sales Manager

Granville P. Rogers has been appointed by the Johns-Manville, Inc., as sales manager of its general automotive equipment department with headquarters in New York City.

VanPelt Succeeds Davison

C. H. VanPelt has been appointed sales and advertising manager of the Cincinnati Ball Crank Co., succeeding V. A. Davison, who has become affiliated with the General Motors Export Co. L. M. Clifford has been appointed Chicago district manager, succeeding L. A. Marre.

L. M. Stewart Resigns

L. M. Stewart, for the last five years vice-president and San Francisco branch manager for the Willys-Overland Pacific Co., has resigned.

Broad Named Sales Manager

Charles J. Broad, who has been with the Durant Motor Co., California factory branch, has been named sales manager in charge of Flint sales for the Benson Motor Car Co., newly appointed San Francisco Flint distributors.

Riemann Made Vice-President

Paul L. Riemann has been made vice-president and director of sales for Norwesco, Marietta, Ohio.

Simms to Arrange for Patents Here

Frederick R. Simms, chairman of the board of directors of Simms Motor Units, Ltd., London, will arrive in this country, Feb. 11, to arrange for some new automobile patents, among them being the Simms Superflex and Pneumatic Couplings and the Simms Magnetic Electric Speedometer. Mr. Simms, who also will visit Canada, is the founder of the Society of Motor Manufacturers and Traders of London.

Wood in Charge of Sales

Harrison B. Wood has been placed in charge of the sales of the passenger car department of the Kleiber Motor Truck Co., San Francisco.

Smith Appointed Coast Manager

Jamie H. Smith has been appointed Pacific coast manager for the Diamond Motor Truck Co. of Chicago.

G. G. HOWE DEAD

MUSKEGON, MICH., Feb. 10—Glenn Greenville Howe, for many years senior vice-president of the Link-Belt Co. of Chicago, died at his home.

A. A. A. Secures Help of Bonding Bodies

Aid Extended in Pushing Campaign Against "Fake" Motoring Organizations

WASHINGTON, Feb. 12—The American Automobile Association, according to a statement just made public here, has secured the support of some of the strong bonding companies in the country, in the prosecution of the association's campaign of extermination against "fake" motoring organizations that have recently been levying tribute on automobile owners.

From the investigation of the A. A. A. of the activities and operations of 100 of these organizations, it developed that in the sale of their alleged service contracts they had been making extensive use of bonds and policies they held with large and reputable insurance and bonding companies.

"The assurance we have just received," says President Thomas P. Henry, "of cooperation from large bonding companies puts the A. A. A. in a stronger position to carry on its campaign, while the results already secured and the protection given the motorists of the country fully justifies its relentless prosecution." Mr. Henry said, however: "The fact must not be overlooked that the gullible motorist must learn his lesson before we can rid the country of this gigantic levy."

H. A. Allen to Address S. A. E. in New York

NEW YORK, Feb. 11—At its meeting to be held on the evening of Feb. 19 at the Hotel Empire the metropolitan section of the Society of Automotive Engineers will discuss the subject "Highway Safety."

Just how far the man at the wheel is personally responsible will be explained by H. A. Allen of the National Bureau of Standards at Washington. It is expected that a large number of State and city officials will be present.

Psychologists from one of the local universities have promised to discuss the mental reactions involved in automobile driving.

CAMP MANAGES REO OFFICE

SAN FRANCISCO, Feb. 11—A. Roy Camp, formerly of the Reo Motor Car Co. of New York and manager of the Brooklyn branch, has arrived here to take the position of manager of the northern California territory for the Reo Motor Car Co. of California, with head offices at San Francisco. Camp succeeds H. E. Woodward, who has been transferred to Los Angeles.

Ford Norfolk Plant to Start March 1

Majority of Dealers in Virginia and North Carolina to Make Headquarters There

NORFOLK, VA., Feb. 11—Ford dealers in 80 counties of Virginia and eastern North Carolina will transfer their headquarters for sales and service to the Norfolk assembly plant of the Ford Motor Co., according to an announcement made by William Wallace, manager. They will be dealers who hitherto have used the Washington plant for service and the Philadelphia and Charlotte, N. C., plants for cars.

The plant will have a capacity of 300 cars a day and will begin assembling about March 1, supplying, however, certain parts and service by Feb. 1. The transfer of records from the three other plants will be completed by Feb. 1, and the executive staff that will handle the business at the new plant will be assembled by that time.

Announcement has been formally made by the company that it contemplates improving the waterfront end of its property adjoining the assembly plant here to provide export facilities for its products to South American markets.

Two of the Ford ships recently purchased, the Oneida and the Onondaga, have been allocated to this port as headquarters, using the army supply base piers pending development of the Ford export terminals.

The assembly plant is located on a site which has deep water frontage on the Elizabeth River, where extensive pier development is available with comparatively small cost.

The company here is assembling its force to operate the assembly plant and has announced that it will launch its operations with about 1200 employees on the payroll.

New Executives Announced for Yellow Cab Company

CHICAGO, Feb. 11—Meeting requirements of the Yellow Cab Manufacturing Company's large expansions in commercial transportation, announcement is made by President John Hertz of the appointment of several important executives. P. L. Emerson, under the new arrangement becomes vice-president in charge of sales of the Yellow Cab Manufacturing Sales Corp. His duties will embrace supervision of all divisions of the sales corporation's activities, including taxicabs, trucks and the Hertz "driveurself system."

Mr. Emerson states that his first efforts will be applied to coordination of the various sales divisions under the classification of "Yellow Cab Revenue Producing Transportation." He has appointed H. T. Kessler as divisional sales manager in charge of New England and Pacific Coast territories. Mr. Kessler has been manager of the sales corporation's San Francisco branch.

Sales promotion will be in the hands of Sam J. Turnes, recently manager of the New England Yellow Cab Sales Agency in Boston. The truck division will continue under the management of V. G. Phillips, father of the Yellow Cab truck dealer plan.

C. S. McElwain will have charge of merchandising the business building department for operators of the Hertz "driveurself system."

INDUSTRIAL NOTES

Federal Motor Truck Co. states that output in 1924, in round numbers, totaled 4200 trucks, against 3500 the preceding year. The company's annual report, it was stated, will not show earnings equal to those of 1923, when it reported $1,102,130 before taxes. The outlook for 1925 is better than at any time in the company's history.

Canadian Products Corp., Ltd., according to E. J. Weil, manager, closed its $2,500,000 plant at Windsor, Ont., permanently at the end of January. He stated that the preferential tariff was insufficient to render manufacturing in Canada profitable. The company is a General Motors subsidiary.

Ford Motor Co. has placed orders for 5,000,000 yds. of drills and sateens for delivery in March, April, May and June in anticipation of large motor sales during those months.

American Cotton Fabric Corp. has gone into voluntary dissolution. Its cumulative 7 per cent preferred stock is to be retired at par and accrued dividends to April 1, 1925.

Ford Motor Co. has bought 475 gondola cars from the Standard Steel Car Co. for use, it was stated, on the Detroit, Toledo & Ironton Railroad.

Harvester Company Adds to Bus and Truck Output

SPRINGFIELD, OHIO, Feb. 10—Production is being increased at the Springfield works of the International Harvester Co. to meet the demands of the trade for motor trucks and motor buses. Orders have been received recently from South Africa and Australia, Superintendent Karl Schreiber reports.

January business was even better than expected and the outlook for the future is considered most encouraging.

There was a steady flow of orders during the last week at the plant of the Kelly-Springfield Motor Truck Co., General Manager Pearl A. Lewis says. Business for the last month was good, he said.

It is his opinion as a result of a survey 1925 is going to be a big year for the motor truck industry.

VAUGHAN LEAVES SEIBERLING

AKRON, OHIO, Feb. 10—The resignation of W. A. M. Vaughan as treasurer of the Seiberling Rubber Co. has been announced. He leaves to become vice-president of the First Trust & Savings Bank here.

METAL MARKETS

Nearly all of the recent advances affect quotations and asking prices rather than actual sales figures. Competition in black sheets continues especially spirited, and bargain hunters encounter little difficulty in finding sellers at $5 a ton below the nominal quotation.

Some mills will not book second quarter business at such low levels, but they will book it for late first quarter shipment, which means that the sheets will not get onto sales books before April.

One of the large independent rollers of full-finished automobile sheets forecasts an advance for the second quarter, but other sellers of this specialty say they have a hard enough time to maintain 4.75c., unprofitable as that price level is at prevailing sheet bar and production costs.

Marked difference is noted between the operating rate of various mills. In fact the high rate of output of some mills is nothing more than the natural result of last December's buying and denotes in no wise current year accessions to their backlog of orders.

Announcement of price advances invariably results in speeding up specifications on old contracts, buyers always feeling that it is safest to have "cheap" steel in their own warehouses rather than due them from mills.

The price of steel bars is now quoted uniformly by sellers at 2.20c., Pittsburgh, but some buyers profess to know of certain sources of supply which will still lend a receptive ear to bids of 2.10c.

All in all, the recent advances, coming upon a market in which demand was diminishing rather than growing, wait for support before they become actually effective. If they can be kept nominally alive until the next buying movement sets in, they will then go into actual force. If such a buying movement fails to develop within a reasonable time, they will disappear. By announcing these advances, however, producers may succeed in keeping the previously ruling prices more nearly intact than they would have been, had they not resorted to this strategem.

Pig Iron.—So far as price is concerned, the record-breaking production of blast furnaces is of slight importance. A paltry 12,000 tons of foreign iron, some of it still afloat, is putting a more effective brake on prices of domestic iron, and blast furnace owners are giving the coke oven operators to understand that they have advanced the wages of their workers at the wrong time if this advance is to be passed on to automotive foundries and other melters. The market is quiet and easy.

Aluminum.—With aluminum once more in the political limelight, the theory is being revived that the market is being kept pegged at its present level for reasons other than those of the relation between demand and supply. There has been practically no change in prices in five or six months, and in this period every other non-ferrous metal has undergone more or less notable price swings.

Copper.—That a 15c. market has become normal amid the present condition of the copper producing and consuming industries is shown by the relative ease with which the metal returned to that level following the recent slump. There are those who talk 16 and 17c. copper, but they are neither producers nor consumers.

Washington Rapid Transit Starts Operating Buses

WASHINGTON, Feb. 10—Four double-deck automobile buses have been placed in operation on the Sixteenth Street line of the Washington Rapid Transit Co., the first of this design ever to be used in the national capital.

As fast as the new buses arrived in Washington, Leon Arnold, president of the bus company, put large signs on them boasting of "better transportation" and had them driven through snow-filled streets with much tooting of horns and free rides to any person who wanted to see the buses put into service.

Calendar

SHOWS

Feb. 7-14—Kansas City, Mo., Annual Automobile Show.

Feb. 9-14—New York, Eleventh National Motorcycle, Bicycle and Accessory Show, Seventy - first Regiment Armory, under the auspices of the Motorcycle and Allied Trades Association.

Feb. 21-28—San Francisco, Pacific Annual Automobile Show.

March 7-14—Boston, Twenty-third Annual Automobile Show.

March 8-14 — Vienna, Spring Fair.

March 20-29—Geneva, Switzerland, Second Swiss International Motor Exhibition.

April 1-17—Sydney, Australia, Royal Agricultural Show. Embraces automobile exhibits.

April 8-14—Bandoeng, Batavia, automobile show under auspices of Netherlands Indies Jaebeurs Fair Association.

April 22-May 7 — Melbourne, Australia, International Automobile Show, under the auspices of the Chamber of Automotive Industries, in conjunction with the Royal Automobile Club of Victoria.

June—Rio de Janeiro, Brazil, Rio Automobile Show, originally scheduled for October, 1924, but postponed for more extensive arrangements.

Sept. 21-26—London, Olympia Motorcycle Show.

Oct. 8-17 — London, Olympia passenger car show.

Oct. 29-Nov. 7—London, annual truck show.

RACES

July 26—Paris, Montlhery Track, French Grand Prix.

CONVENTIONS

June 22-27—Summer convention of the Automotive Equipment Association at the Broadmoor Hotel, Colorado Springs, Colo.

S. A. E. MEETINGS

Feb.—Indiana Section, Automobile Finishes.

Feb. 16—Cleveland Section, Electrical Instruments and Measuring of Chassis Tests by Means of Them, J. H. Hunt, General Motors Research Corp., Old Colony Club, Cleveland.

March—Indiana Section Developments in Transmission.

March 16 — Cleveland Section, Road and Riding Ability, Harry Horning, Waukesha Motor Co., Old Colony Club, Hotel Cleveland.

April 9—Indiana Section, Talk by J. H. Hunt, head of electrical division, General Motors Research Corp.

June 15-19—Summer meeting of the Society of Automotive Engineers at White Sulphur Springs, W. Va.

Sees Export Gain in Automotive Trade

WASHINGTON, Feb. 11—Confident prediction that foreign trade of the automotive industry in 1925 will register further improvement over 1924, when the magnitude exceeded even the most optimistic predictions, was made here by Percy Owen, chief of the automotive division of the Department of Commerce, after he had completed a minute survey of the annual series of special articles reviewing developments of last year in automotive export trade.

In the United States automotive products are now being shipped abroad at a rate of over $4,600,000 every working-day week.

On the strength of available trade figures for 1924, automotive products continued to stand first among all manufactured articles exported from the United States, when valuations of $221,000,000 were reached, according to Mr. Owen. Among exported products of all kinds, automotive shipments stand third, being exceeded only by unmanufactured cotton and mineral oils.

In addition to the total value of United States' automotive shipments, Canada exported products worth $31,000,000 bringing the total of the two countries for 1924 to $252,000,000, the highest valuation on record excepting that of 1920, when, because of abnormally high prices and inflated demand, automotive exports amounted to $300,000,000.

Decrease in Canada

Mr. Owen sets forth that for the United States alone the increase in value over 1923 of the automotive export trade has been almost exactly 25 per cent. For Canada, on the other hand, there has been a decrease of about 16 per cent, largely attributed to decreased shipments to British areas which are now being supplied directly from the United States. Among the commodities which make up the total, passenger cars are far in the lead, followed in order by parts and accessories, trucks, motor cycles and parts, garage servicing appliances, and on down through a list of less important products.

The extent to which export trade in cars and trucks during 1924 increased over 1923 is well expressed in the ratio between exports and production. On the basis of exports of cars and trucks from the United States and Canada, compared with the total production of these vehicles, the ratio during 1924 was 6.5 per cent, as compared with 5.3 per cent in 1923.

The increase is partly accounted for by a drop in the production figure, but is further accentuated by the fact that the number of units shipped in 1924 was almost 14,000 more than in the preceding year. The increase in exports despite lessened production is especially noteworthy.

Guyot Specials Entered for Indianapolis Race

PARIS, Feb. 3 (*by mail*)—First European entries to be received for the Indianapolis 500-mile race comprise three Guyot Specials, built by Albert Guyot in Paris. These cars have a six-cylinder engine with a single sleeve valve of the same general design as the British Argyll engine.

T. E. Myers, general manager of the Indianapolis Speedway, who is at present in Paris, expects to collect entries from Bugatti in France, Alfa-Romeo and Fiat in Italy, Mercedes in Germany and Sunbeam in England.

While in Paris Mr. Myers has visited the new track at Montlhery, 20 miles south of the city, and has expressed his surprise and admiration at the work undertaken, which comprises not a one and a half mile concrete track, but eight miles of road specially constructed for racing purposes, with a width of 35 ft.

IOWA CORD TIRE CHANGES

DES MOINES, IOWA, Feb. 11—Stockholders of the Iowa Cord Tire Co. at their annual meeting accepted the resignations of C. L. Archer, president, and R. K. Blazer, secretary, and John Gay was added to the directorate.

French Not Likely to Hold 1925 Show

PARIS, Feb. 3 (*by mail*)—That an automobile show in Paris is not desirable in 1925 is the opinion of the French Chambre Syndicale des Constructeurs d'Automobiles, an organization corresponding to the American Automobile Chamber of Commerce.

The French show is organized by a joint committee composed of delegates from the various trade associations. This year the Grand Palais, in which the show has been held, has been turned over to a government decorative arts exhibition and will not be released until the end of October. The Grand Palais, therefore, cannot become available for an automobile exhibition until November, which would put it on the calendar after the London show. The French manufacturers refuse to take second place, and they have also declined the offer of a new and bigger exhibition hall in the western end of the city.

While the action of the Chambre Syndicale in voting against a 1925 show does not remove all possibility of the event being held, it makes the exhibition very doubtful. In certain quarters it is believed that this vote must be looked upon a piece of coercion to get the government to give up the Grand Palais in time for an October show.

Henri Cezanne, show manager, refuses to make any statement.

A. J. FRANK KILLED BY FALL

MILWAUKEE, Feb. 10—Arthur J. Frank, general manager of the Federal Rubber Co. division of the Fisk Rubber Co. at Cudahy, a suburb of Milwaukee, was instantly killed when he slipped on the icy roof of a five-story building while leaning over the parapet, and plunged 60 ft. to a concrete areaway below. Mr. Frank was accompanied by George J. Mead, plant layout engineer, on a tour of inspection. Mr. Frank was 37 years old and had been associated with the Federal Rubber Co. for 15 years.